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FOOD TECHNOLOGY ABSTRACTS

Volume 21 No.12

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National Information Centre for Food Science and Technology

Central Food Technological Research Institute,

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GENERAL

- 060 SWAMINATHAN (MS). Sustaining nutrition security in Africa: Lessons from Asia. *Agric. Situat. India*. 41(5); 1986; 279-97
This article is based on the First Tanco memorial lecture delivered by the author at Rome on 17th June 1986. The aspects discussed include: Immediate measures; medium-term measures; contrasting characteristics of Asia and Africa; sustainable nutrition security; food protection strategies; the experience of India; package of technology; package of services; package of Government policies; symphonic and knowledge intensive production systems; and sustainable nutrition security plan for Africa. BSN
- 061 SUBRAHMANYAM (KV). Post-harvest losses in horticultural crops: an appraisal. *Agric. Situat. India*. 41(5); 1986; 339-43
- 062 GEORGE (DS). Changes facing the processed food industry toward 2000. *Food Technol. Aust.* 38(3); 1986; 111-12, 117
- 063 German Society for Quality Research (Foods of Vegetable Origin). Symposium on "Requirements relating to Quality of Plants, with production alternatives in agriculture and horticulture". 10-11 March 1986. *Gordian*. 86(4); 1986; 72 (German)
Summaries of two papers are presented here: KUBLER (W) - Significance of plant foods for covering the requirements of essential minerals and vitamins; FELDHEIM (W) - Nutritional-physiological significance of lupins. KMD
- 064 ACHINEWHU (SC). Unconventional sources of food: Chemical composition of rubber seed (*Hevea brasiliensis*). *Food Chem.* 21(1); 1986; 17-25
- 065 BLENFORD (D). The rough with the smooth. *Food Flavour. Ingrid. Process. Packag.* 8(6); 1986; 19,21
Discusses: Refined fibre products; cereal products; vegetable and fruit products; and gum and cellulose sources. BSN
- 066 HART (RT). New functional ingredients. *Food Flavour. Ingrid. Process. Packag.* 8(6); 1986; 35,37
Discusses: Protein foams; basic and acidic proteins; fat-resistant protein foams; applications of basic proteins; sources of basic proteins; and future developments. BSN
- 067 BANKS (J). Natural alterantives. *Food Flavour Ingrid. Process. Packag.* 8(5); 1986; 43,45,47
Discusses: photodynamic decontamination; lactoperoxidase systems; chemical basis for microbial antagonism; and broad-spectrum inhibitors. BSN
- 068 HEINER (H). Industrial waste water treatment and waste air purification. *Fette Seifen Anstrichm.* 88(2); 1986; 75-7 (German)

FOOD PROCESSING AND PACKAGING

Processing

- 3069 CHEN (J), REINECCIUS (GA) and LABUZA (TP). Prediction and measurement of volatile retention during extrusion processing. *J. Food Technol.* 21(3); 1986; 365-83

The loss of volatiles during extrusion of a corn-based product was studied. Four organic flavour compounds were tested: n-butanol, octane, benzaldehyde and limonene. A method was developed to calculate the vapour pressure of the volatile at the extruder die exit temperature through use of the Henry's law coefficient. Two models were developed to predict loss of volatiles. The thermodynamic model assumed complete equilibrium between the solid and vapour phase. This model gave moderate to poor prediction of retention for n-butanol but was within 20-30% for limonene and benzaldehyde. A second model based on relative volatility with respect to water loss, as assessed by steam distillation, gave predictions which were good for both n-butanol and benzaldehyde. This latter model has potential for prediction of retention of polar flavour compounds. AA

- 3070 CHEFTEL (JC). Nutritional effects of extrusion-cooking. *Food Chem.* 20(4); 1986; 263-83

Effect of HTST extrusion-cooking on protein, starch, fibre, vitamins and mineral content of food mixes has been reviewed. KAR

Packaging

- 3071 YOKOYAMA (M). Aseptic packaging in Japan. Present situation and prospective view. *Packag. Jpn.* 6(32); 1986; 19-20

- 3072 ISHIDA (O). Recent multilayer plastic containers in Japan. *Packag. Jpn.* 6(32); 1986; 21-3

Discusses: coextrusion thermoform; coinjection stretch and OPET bottle; and coextrusion stretch. BSN

- 3073 ANON. New movement in heat proof food container. *Packag. Jpn.* 6(32); 1986; 24-6

- 3074 SIMMONS (B). Developments in plastic packaging. *Food Manuf.* 61(4); 1986; 27,29,31,32

- 3075 COCCHIERI (RA). Occurrence of phthalate esters in Italian packaged foods. *J. Food Prot.* 49(4); 1986; 265-6

Two hundred samples of Italian plastic-packaged food products were examined for the presence and concentration of phthalic plasticizers. Di-n-butylphthalate (DBP) was detected in 97, 80, 95, 100 and 49% of cheese, salted meat, vegetable soup, potato chips and milk samples, respectively. No DBP was recovered from jams and baby food. The mean levels of contamination with DBP varied from 0.07 to 2.80 $\mu\text{g/g}$. Di-2-ethylhexyl phthalate (DEHP) was determined in 80, 71, 94 and 52% of salted meat, jam, baby food and milk samples, respectively, and in all the cheese and vegetable soup samples. The mean DEHP values ranged between 0.21 and 2.38 $\mu\text{g/g}$. AA

FOOD ENGINEERING AND EQUIPMENT

- 3076 HOLDSWORTH (D). The chill factor. *Food. Flavour. Ingrid. Process. Packag.* 8(4); 1986; 23,25,27

The use of refrigeration in production of food products for retail consumption has been briefly discussed, with special reference to chilling operations, ensuring product safety, temperature monitoring and the future of chilled food industry. BSN

- 3077 ANON. Spray drying - home and dry. Food Flavour Incred. Process. Packag. 8(5); 1986; 30-31, 33

Discusses: drying techniques; advantages of spray drying; how spray drying works; meeting future needs; specialist products and contact drying. BSN

- 3078 ROMERO-FERRER (DE), AMUNDSON (CH) and HILL (CG) Jr. The effects of gas injection on the efficiency of thermal energy utilization in spray drying. J. Food Process Eng. 8(3); 1986; 171-91

The use of gas injection led to a decrease in the thermal energy required for evaporation by spray drying. The magnitude of this effect was larger at the lower levels of feed pressure, feed concentration, and drying temperature. However, this does not imply that spray drying is more energy efficient than multi-effect evaporation and reverse osmosis. KAR

- 3079 SCHULER (EW). Twin-screw extrusion cooking systems for food processing. Cereal Food World. 31(6); 1986; 413-6

The design features and operating principles are discussed. KAR

- 3080 RIZVI (SSH), BENADO (AL), ZOLLWEG (JA) and DANIELS (JA). Supercritical fluid extraction: Fundamental principles and modeling methods. Food Technol. 40(6); 1986; 55-65

- 3081 GERLING (JE). Microwaves in the food industry: Promise and reality. Food Technol. 40(6); 1986; 82-3

The main problems in introducing microwaves in the food industry and the guidelines for success have been covered. KAR

- 3082 MUDGETT (RE). Microwave properties and heating characteristics of foods. Food Technol. 40(6); 1986; 84-93,98

This article reviews the electrical properties of foods affecting time-temperature profiles in microwave food processing; summarizes some research results in modeling pasteurization processes for liquid and high-moisture semisolid foods; discusses anomalous heating effects of interest in microwave processing and suggest areas of applied research which may be useful in the future development of microwave pasteurization and sterilization processes. KAR

- 3083 SCHIFFMANN (RF). Food product development for microwave processing. Food Technol. 40(6); 1986; 94-8

The major points that a food technologist is to consider while developing food products for successful microwave processing include, microwave interactions with materials, parameters affecting microwave heating which include; frequency, microwave power and speed of heating, mass, moisture content, density and temperature. The physical geometry of the product exerts its influence depending upon size, shape, conductivity, and specific heat. KAR

- 3084 EDGAR (R). The economics of microwave processing in the food industry. Food Technol. 40(6); 1986; 106,112

Aspects dealt in the article include investment on machinery, effects of under- and overtempering of products, differential cost flow analysis for microwave tempering vs tempering room and for microwave cooking; investment analysis of microwave tempering, and payback period for 400-kW modular cooking system. KAR

- 3085 DECAREAU (RV). Microwave food processing equipment throughout the world. *Food Technol.* 40(6); 1986; 99-105

Article deals with microwave processes and equipment including tempering, cooking, dehydration, baking, pasteurization, sterilization and such other processes. KAR

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

- 3086 BECKMANN-GIOMATZIDOU (P) and NIEBERGALL (H). Chemical behaviour of biphenyl thiourea in foodstuffs and simulating agents during migration. Part 3: Reactions with biogenic amines. *Dtsch-Lebensmittel-Rundschau*. 82(5); 1986; 141-6 (German)

Phenylisothiocyanate, formed by decomposition of diphenylthiourea, reacts with the biogenic amines colamine, β -phenylethylamine, tyramine and putrescine to thiourea with corresponding substitution. The influence of the concentration of the amine, of the acid content and the nature of the medium is discussed. With colamine it is shown, that the reaction also takes place under food specific conditions. The unknown substances N-2-(4-Hydroxyphenyl)-ethyl-N'-phenylthiourea and N-(4-Amino)-butane-N'-phenyl-thiourea were isolated and identified. AA

- 3087 SCHWEDT (G). Test-strip reflectometry for ascorbic acid, potassium, nitrate/nitrite and sulphite in food. *Dtsch. Lebensmittel-Rundschau*. 82(4); 1986; 111-6 (German)

We examined the applicability of commercially available test strips, with reflectometrical evaluation of the colour intensity, to various substances in foodstuffs by comparing different methods. As laboratory methods, we utilized polarography (ascorbic acid), AAS and ion chromatography (potassium), HPLC (nitrate/nitrite), and photometry (sulphite). For the food samples selected (most beverages also pressed juices and some solid foods of both vegetable and animal origin), results were well in accordance. Major deviations are mainly encountered in those cases where liquid samples contain colourants that are adsorbed at the cellulose layer of the test zone. Concentrations measurable through reflectometry are for ascorbic acid 60 to 800, potassium 200 to 1400, nitrate 10 to 100, nitrite 1 to 30, and sulphite (as SO_2) 10 to 120 mg per litre. AA

- 3088 GIANNAKOPOULOS (A) and GUILBERT (S). Determination of sorbic acid diffusivity in model food gels. *J. Food Technol.* 21(3); 1986; 339-53

The diffusional behaviour of sorbic acid in model food gels is discussed. The apparent diffusivity (D_a) of sorbic acid in a aqueous gel containing 1.5% w/w agar, when determined by monodimensional diffusion (infinite gel columns) was found to be 8.8, 8.9 or 9.2 $\times 10^{-10} \text{ m}^2/\text{sec}$ at 25°C depending on the method of calculation (eye fitting, eye fitting graphical method or computerized fitting method) and 8.7 $\times 10^{-10} \text{ m}^2/\text{sec}$ when determined by tridimensional diffusion (gel cubes immersed into an appropriate solution). The two methods displayed a good agreement; the tridimensional diffusion method had slightly worse repeatability than the monodimensional method (coefficient of variation $\leq 10\%$ instead of 5.5% for the infinite gel columns) but has the advantage of being simple and rapid (1-3 hour instead of 24 hour). For the tridimensional diffusion method, (D_a) values of sorbic acid measured

by inward and outward diffusion in gel cubes of different compositions were found to be not significantly different, which suggests an absence of partition effects between the immersion solution and the gel. D_a values appear to be slightly dependent on the gelling agent concentration (1.5, 2.5 and 4% w/w agar) in gel containing 40% w/w glycerol and 60% water. D_a values of sorbic acid decreased when the temperature decreased. An apparent activation energy of 18 KJ/mol was found for the diffusion of sorbic acid. This value was similar to the activation energy for the change in viscosity of the solution occluded in the gel network. D_a values were influenced by the concentration of the diffusant, with a slight decrease when initial concentration of sorbic acid increased, following a linear relationship. The product $D\eta$ when η is the viscosity of the solution occluded in the gel was approximately constant. AA

- 3089 BOGNAR (A). Determination of vitamin A in food using HPLC results of the collaborative study of the working group "vitamin analysis" within the framework of § 35 LMBG. Z. Lebensmittel-Unters Forschung. 182(4); 1986; 492-7 (German)

A standard method using HPLC for the quantitative determination of vitamin A in food is described. The test material is saponified with aqueous ethanolic potassium hydroxide, and the vitamin A alcohol liberated is extracted with n-hexane. After concentration of the extract, the residue is dissolved in methanol and the vitamin A content determined, after HPLC separation on a RP-C₁₈ column, by means of an UV or fluorescence detector. The analytical method had been developed by the working group "Vitamin Analysis" within the framework of § 35 LMBG; reproducibility and agreement in results between laboratories were checked in vitamin A enriched milk powder and gruel in a collaborative study in which 13 laboratories participated. The statistical evaluation of the results of the collaborative study has shown sufficient reliability to recommend the method for inclusion in the Official List acc. to § 35 LMBG. The method is applicable for the determination of natural vitamin A and vitamin A ester added to dietetic food. AA

- 3090 VOGELGESANG (J) and THIER (HP). Contributions to the analysis of pesticide residues in foods which are ready for consumption. Z. Lebensmittel-Unters. Forsch. 182(5); 1986; 400-406 (German)

The well proven Specht clean-up procedure was miniaturized as far as possible, and combined with glass capillary gas chromatography, using on-column injection and ECD, and thermionic detection (dual column gas chromatography). More than 50 ready-to-eat foods were analyzed by this procedure. Detection and determination of organochlorine and organophosphorus pesticide residues was almost always possible, even at the low concentration range of 1 µg/kg or less. The exceptions were foods which exhibited interfering peaks from co-extractives even in their uncooked form. Cooking, frying, baking, etc. often reduced the interfering compounds effectively. KMD

FOOD LAWS AND REGULATIONS

N11

FOOD MICROBIOLOGY

- 3091 ENTIS (P) and BOLESZCZUK (P). Use of fast green FCF with tryptic soy for aerobic plate count by the hydrophobic grid membrane filter.

J. Food Prot. 49(4); 1986; 278-9

A hydrophobic grid membrane filter (HGMF) method for aerobic plate count using Tryptic Soy Agar with fast green FCF was evaluated against a conventional pour plate method on 250 food samples, representing 25 product categories. The HGMF method yielded counts equivalent to or significantly higher than the pour plate method for 24 of the 25 product categories (t-test for paired data). AA

- 3092 FLEET (GH) and MANN (F). Microbiology of natural mineral water: an overview with data on Australian waters. Food Technol. Aust. 38(3); 1986; 106-10

The microbial ecology of natural mineral waters is reviewed in relation to the presence of indigenous and contaminating species. Factors affecting the survival and growth of these microorganisms, the public health significance of the species present and proposed end-product specifications for bottled waters are discussed. KAR

Ethanol

- 3093 MULDER (MHV) and SMOLDERS (CA). Continuous ethanol production controlled by membrane processes. Process Biochem. 21(2); 1986; 35-9

Discusses: Membrane processes; membrane distillation; pervaporation; evaluation of the membrane processes in a membrane bioreactor; and future prospectives. BSN

Glycerol

- 3094 VIJAIKI SHORE (P) and KARANATH (NG). Glycerol production by fermentation. A review. Process Biochem. 21(2); 1986; 54-7

Discusses: Selection of microorganisms; photosynthetic production of glycerol; potential industrial organisms; choice of bioreactor system; batch reactor; batch cell recycle; fed batch process; continuous process; immobilised cell systems; membrane bioreactors; raw materials; optimization of the nutritional and operational parameters; and recovery of glycerol from the fermentation media. BSN

Aeromonas hydrophila

- 3095 PALUMBO (SA), JENKINS (RK), BUCHANAN (RL) and THAYER (DW). Determination of irradiation D-values for *Aeromonas hydrophila*. J. Food Prot. 49(3); 1986; 189-91

This study examined the radiation resistance of *Aeromonas hydrophila*, a psychrotrophic pathogen of emerging importance. Five strains of *Aeromonas hydrophila* (three clinical and two food isolates) were irradiated in a Cesium-137 source at doses upto 150 krads. The bacterium was irradiated in growth broth, phosphate buffer, ground bluefish or ground beef. Surviving bacteria were counted on nutrient agar or starch ampicillin agar. Radiation resistance was expressed as D-values (dose in Krads to yield a 10-fold decrease in viable number) and ranged from 14 to 22 Krads at 2±1 °C for most variables studied. Decreasing the temperature during irradiation increased the radiation resistance (raised the D-values). The results of this study indicate that a pasteurizing dose of ionizing radiation of 150 krads is sufficient to kill the levels of *Aeromonas hydrophila* found in retail fresh foods. AA

Lactobacillus

- 3096 BURROWES (OJ), SCHMIDT (FH), SMITH (KL) and CHAMBERS (JV). Evaluation of summer sausage manufactured using mixed *Lactobacillus* and *Leuconostoc* starter culture. J. Food Prot. 49(4); 1986; 280-81

A 1:1 mixture of *Leuconostoc* and *Lactobacillus plantarum* and of *L. plantarum* alone were used as starter-cultures in making two batches of summer sausage. Sausage samples were evaluated for volatile flavour compounds and by sensory evaluation. Ethanol was the primary volatile flavour compounds in the sausage from mixed culture while acetaldehyde predominated in the single culture sausage. Sensory evaluation indicated a significant difference ($p < 0.01$) between the two types of sausages with 66% of the panelists preferring sausage prepared with *L. plantarum* alone. AA

Plesiomonas

- 3097 MILLER (ML) and KOBURGER (JA). Evaluation of inositol brilliant green bile salts and *Plesiomonas* agar for recovery of *Plesiomonas shigelloides* from aquatic samples in a seasonal survey of the Suwannee River estuary. *J. Food Prot.* 49(4); 1986; 274-77

Two plating media, inositol brilliant green bile salts (IBB) and *plesiomonas* (PL) agars, were compared using surface plating procedures for the recovery of *Plesiomonas shigelloides*. IBB was more effective in both the percentage of positive samples recovered and the percentage of isolates confirmed as *P. shigelloides*. Pure culture studies of heat- and cold-injured cells, however, showed that IBB agar failed to recover many of these organisms. Samples examined were from the Suwannee River estuary and included water, sediment, fish, crabs and molluscs. This survey found a high incidence (58.7%) of *Plesiomonas* in environmental samples. Counts of *P. shigelloides* per gram of sample differed among the various types of samples, ranging from 101 CFU/g in water and oysters to 10^6 CFU/g in bream. AA

Pseudomonas

- 3098 PATEL (TR), JACKMAN (DM), WILLIAMS (GJ) and BARTLETT (FM). Physico-chemical properties of heat-stable proteases from psychrotrophic pseudomonads. *J. Food Prot.* 49(3); 1986; 183-8

Four purified heat-stable proteases from psychrotrophic pseudomonads were characterized and compared with other similar purified proteases. Amino acid compositions, hydrophobicities, Difference Index (DI) values, heat-stabilities, metal ion contents and N-terminal amino acids of these proteases were examined. Some similarities as well as differences in their amino acid compositions were observed. All were inactivated by EDTA-treatment and the apoenzymes were reactivated with either Ca, Mg or Mn ions. Proteases T25, T20, T16 and T13 contained 16, 8, 4 and 5 g atom per mol of Ca, respectively. Except for protease T20 which showed 4 g atom per mol of Mg, the other proteases showed less than 1 g atom per mol of the element. The Mn content of the proteases was negligible (less than 0.1 g atom per mol). The presence of exogenous Ca afforded protection to the protease activity in the partially purified enzymes when subjected to heat treatment. Heated samples of proteases when stored in cold regained activity indicating renaturation of the proteins. Threonine was tentatively identified as the N-terminal amino acid in the four purified proteases. Similarities and differences observed between purified proteases are discussed. AA

Streptococcus

- 3099 SINHA (RP). Evaluation of inorganic phosphate on growth and lactose metabolism of lactic streptococci in batch and continuous culture. *J. Food Prot.* 49(4); 1986; 260-64

Addition of 1.9% inorganic phosphates (K_2HPO_4 , 1.33% + KH_2PO_4 , 0.57% weight/volume) in place of 1.9% disodium β -glycerophosphate (GB) in M17 medium (M17P) resulted in increased buffering capacity.

Even at equimolar concentration (88 mM), Na_2HPO_4 (M17P1) or K_2HPO_4 (M17P2) showed higher buffering than GP(M17). Cultures consistently showed lower cell density in M17P2 than in other buffered media after 7 hours of growth at 32°C, suggesting that buffering media with Na_2HPO_4 is better than buffering with K_2HPO_4 for cultivation of lactic streptococci. The effect of buffering media with Na_2HPO_4 on culture growth and appearance of lactose-negative (Lac) variants was also tested under continuous culture growth conditions in a chemostat. Growth of *Streptococcus lactis* C2 continuously at pH 6.8 for 168 hours in M17P1, and M17 broths at 32°C failed to yield any lac strains. Results showed that successful propagation of lactic streptococci in continuous culture growth can be achieved without enriching for cells with undesirable metabolic characteristics. AA

Fungi

- 3100 KOBURGER (JA). Effect of pyruvate on recovery of fungi from foods. *J. Food Prot.* 49(3); 1986; 231-2

The addition of 0.5% sodium pyruvate to antibiotic-supplemented plate count agar significantly increased the recovery of fungi from 50 food samples. Both yeasts and molds responded to the addition of pyruvate, with an overall increase in recovery of 8.0%. AA

FOOD ADDITIVES

Flavours

- 3101 SALZER (U-P). Fast flavours. *Food Flavour. Ingrid. Process. Packag.* 8(4); 1986; 34-5

Discusses: History; manufacture and properties; flavour types; applications; cheese analogues; sauces, dressings and others; and market data. BSN

Sorbic acid

- 3102 OBANU (ZA) and LEDWARD (DA). Reactivity of sorbate and glycerol in some model intermediate moisture systems. *Food Chem.* 21(1); 1986; 57-75

Model systems were developed to study the role of selected humectants and antimicrobials in the non-enzymatic browning, haemoprotein breakdown and collagen degradation reactions at a_w 0.85 and initial pH 5.5. a_w adjustment was made using NaCl and the solutions contained 0.5% glucose, 0.5% sorbate, 0.5% propionate, 30% glycerol or 30% glycerol plus 0.5% sorbate. During aerobic storage at 38°C or 65°C 10% lysine or glutamate solutions all exhibited increased browning and 0.01% or 0.02% haemoglobin solutions increased loss of haemoprotein from solution in the presence of glycerol and/or sorbate. KAR

Aspartame

- 3103 RIZZI (GP) and ECHLER (RS). A new, hydrolytically stable, sweet tasting aspartic acid derivative. *Food Chem.* 20(3); 1986; 165-734

N-Aspartylethanolamines are a novel class of sweet tasting compounds which offer greater hydrolytic stability than L-aspartyl-L-phenylalanine methyl ester (Aspartame) at neutral pH. Within the class, optimum relative potency (60 X) and sucrose-like taste character were observed for N-(L-aspartyl)-3S-amino-2S-hydroxy-6-methylheptane. Physical properties and a practical synthesis of this compound are described. AA

- 3104 DAVOLI (E), CAPPELLINI (L), AIROLDI (L) and FANELLI (R). Serum methanol concentrations in rats and in men after a single dose of aspartame. *Food Chem. Toxicol.* 24(3); 1986; 187-9

Serum methanol concentrations were measured in rats and in humans given oral aspartame. The dose given to rats was the FDA's projected 99th percentile daily intake for humans, assuming aspartame were to replace all sucrose sweeteners in the diet (34 mg/kg). Four male adult volunteers each received 500 mg, equivalent to 6-8.7 mg/kg, which is approximately the FDA's estimate of mean daily human consumption. Both treatments caused a rise in serum methanol. In rats the mean peak value was 3.1 mg/litre 1 hour after administration; serum methanol returned to endogenous values 4 hours after treatment. In the men, the mean rise over endogenous values was 1.06 mg/litre after 45 minutes. Two hours after treatment, serum methanol had returned to basal levels. The temporary serum methanol increase showed peak values within the range of individual basal levels. AA

Sorbitol

- 3105 MACKENZIE (KM), HAUCK (WN), WHEELER (AG) and ROE (FJC). Three-generation reproduction study of rats ingesting upto 10% sorbitol in the diet- and a brief review of the toxicological status of sorbitol. *Food Chem. Toxicol.* 24(3); 1986; 191-200

Groups of 12 male and 24 female 5-week-old Charles River CD(SD) BR rats (F_0) were fed a sucrose-containing ground cereal-based diet in which 0, 2.5, 5.0 and 10.0% (w/w) sorbitol was included at the expense of sucrose. The rats were first mated after 14 weeks on the diet. F_{1a} litters were born 19 weeks after the start of the study and F_{1b} litters at week 30. Groups of 12 male and 24 female F_{1b} rats were first mated when 18 week old. They gave rise to F_{2a} litters after 3 weeks and to F_{2b} litters to 10 week later. Likewise, groups of 12 male and 24 female F_{2b} rats were first mated when 18 week old, producing F_{3a} and F_{3b} litters week and 10 week later, respectively. F_0 rats were killed 33 weeks after the start of the study, F_{1a} in week 22, F_{1b} in week 68, F_{2a} in 57, F_{2b} in 92 and F_{3a} in week 92 and F_{3b} in week 96. Apart from slight reduction in food consumption in sorbitol-fed F_{1b} males and inbody-weight gain in sorbitol-fed F_0 , F_{1b} and F_{2b} rates of both sexes, treatment was associated with no clinically observed effects. There were no deaths attributable to treatment and no adverse effects on mating performance or pregnancy rats in the parent animals of any generation. Treatment was associated with no consistent adverse effect on any measure of reproductive performance or behaviour during gestation or lactation. No abnormal pups were observed in any generation. Not unexpectedly, caecal enlargement was consistently observed at necropsy of sorbitol-treated rats of all generations and significant rises in serum calcium were observed in F_0 males and females exposed to 10% sorbitol and in F_{1b} males exposed to either 5 or 10% sorbitol. Differences between treated and control F_{3a} rats in respect of T3 and TSH levels were probably spurious as they followed no consistent pattern. Similarly, between-group variations in gonadal weight were considered to have no toxicological significance because they lacked consistency and were not accompanied by any histologically evident changes. Microscopic examination of lesions from F_{1a} and F_{1b} animals, of gonads from F_{1b} and F_{2b} and of selected tissues from the F_{3a} generation revealed no changes of toxicological significance. A reduced incidence of hepatocytic swelling in 10% sorbitol-treated F_{3a} females was thought to reflect no more than the slight difference in nutritional status between these animals and the controls. No abnormalities of the adrenal medulla were seen grossly in any generation or microscopically in the high-dose and control F_{3a} rats. It is concluded that sorbitol administered in the diet to three successive generations at levels up to 10% had no adverse effect on growth or repro-

ductive performance in either sex. AA

CEREALS

- 3106 ANGERMANN (A). Milling technology and flour types. *Gordian*. 86(4) 1986; 66-71 (German)

Now-a-days, bakers and other users of milled grain products want to use only those types of flours and milled products which meet their rather stringent requirements in terms of composition and nutritional quality. The author has discussed various types of flour available on the German market, and has proposed new regulations and specifications for the 5 types of wheat flours and 4 types of rye flours, as well as for wheat semolina and rye semolina. KMD

- 3107 WHITFIELD (RD). An unsteady-state simulation to study the control of concurrent and counter-flow grain driers. *J. Agric. Eng. Res.* 33(3); 1986; 171-8

In this report, a steady state model is adapted to deal with the unsteady states which occur when the inputs to the drier are changing. This allows control systems to be modelled. The simulation is used to develop and test a control system for a simple concurrent flow drier with a counter flow cooling bed. Experimental data were available for this drier and the accuracy of the model, for control system development is discussed. KAR

- 3108 ITUEN (EUU), MITTAL (JP) and ADIEDI (JS). Water absorption in cereal grains and its effect on their rupture stress. *J. Food Process. Eng.* 8(3); 1986; 147-58

Well dried maize, sorghum and millet grains take about 96, 48 and 24 hours respectively to reach their water absorption capacities (water absorption saturations). Millet had the highest rate of water absorption as well as the total water absorbed. The rate of water absorption in sorghum was higher than in maize, but maize grains imbibed more water than sorghum. The rupture stress of the grains was seen to decrease, with increase in moisture content except for maize which showed a rapid rise only, at the onset of the increase in moisture content. KAR

- 3109 FERNANDO (T) and BEAN (G). Production of trichothecene mycotoxins on cereal grains by *Myrothecium* spp. *Food Chem.* 20(3); 1986; 235-40

Barley, oats and wheat were inoculated with six isolates of *Myrothecium* spp and the amounts of roridin A and Verrucaridin A were detected in oats and wheat, respectively, whilst the lowest level was reported in barley. KAR

Rice

- 3110 DONANGELO (CM), PEDERSEN (B) and EGGUM (BO). Protein, energy and mineral utilization in rats fed rice-legume diets. *Qual. Plant. Plant Food Hum. Nutr.* 36(2); 1986; 119-37

Protein, energy and mineral utilization were examined in growing rats fed cooked, dry legume seeds in combination with polished rice. The legumes tested included 3 varieties of common beans, black, white and brown (*Phaseolus vulgaris*), lentils (*Lens esculenta*) and peas (*Pisum sativum*). The rice:legume mixtures (1:1 N ratio) were the only dietary sources of protein, Zn, Fe and Cu. The rice:black bean mixture was also tested at a 4:1 N ratio. Nutrient utilization was studied by balance trials and mineral utilization was further assessed by tissue analyses. True protein digestibility (TD) and energy digestibility of the rice:legume (1:1) mixtures were high. Biological

value (BV) varied only little but was lowest in the rice:lentil mixture. The rice:brown bean mixture had the lowest amount of utilizable protein (UP). The (1:1) rice:legume mixtures did not adversely affect Fe status, as measured by liver Fe content and blood hemoglobin and hematocrit, or Cu status, as measured by liver Cu content and plasma ceruloplasmin. However, femur zinc content indicated a sub-optimal Zn status. Increasing the dietary N from rice in combination with black beans resulted in a substantial improvement of BV, NPU and Zn status of the animals but had a negative effect on UP and Fe status of the rats. AA

Rice bran

- 3111 SREENARAYANAN (VV) and CHATTOPADHYAY (PK). Rice bran stabilization by dielectric heating. *J. Food Process. Preserv.* 10(2); 1986; 89-90

Rice bran is an important by-product of rice milling as it contains about 15 to 25% oil. The rapid breakdown of the oil into free fatty acid (FFA) begins immediately after milling, rendering the oil nonedible by the action of a very active lipase enzyme present in it. To inactivate the enzymes responsible for the deterioration of the oil, rice bran samples were exposed to dielectric-heating for different durations. These samples were stored in sealed polyethylene bags for a period of six weeks. The increase in FFA in oil during the storage period of six weeks was found to be only 2% in the case of the samples exposed for 6 to 7 minutes while for the untreated samples the FFA rise was observed to be 75% for the same storage period. AA

- 3112 PRABHAKAR (JV) and VENKATESH (KVL). A simple chemical method for stabilization of rice bran. *J. Am. Oil Chem. Soc.* 63(5); 1986; 644-6

A new simple chemical method for stabilization of rice bran is described. The process, based on the principle that lipase activity will be low at low pH, uses hydrochloric acid at 40 l/ton of bran for lowering the pH of rice bran from 6.9-6.0 to 4.0. The acid can be applied easily by sprinkling or spraying. The operation on small lots can be done by hand mixing of bran, but it is more efficient and effective if mechanical mixing, like a rotary or a trough mixer, is used. This simple method, which takes less than 4 minutes for a batch of 15 kg, will be useful for stabilization of rice bran in rice mills or where steam or electricity is unavailable. The process is being evaluated in commercial trials. AA

Ryes

- 3113 FRETZDORFF (B) and WEIPERT (D). Phytic acid in cereals. 1. Phytic acid and phytase in rye and rye products. 2. *Lebensmittel-Unters Forsch.* 182(4); 1986; 287-93 (German)

Phytic acid in food is considered to be responsible for a reduced bioavailability of essential dietary minerals; its detrimental effects can be diminished by hydrolysis with phytase during processing. The average phytic acid content was 8.18 mg/g and 3.44 mg/g and average phytase activity was 3.7 U/g and 2.6 U/g in rye kernels and in flour (Type 997, 1.09 ash content), respectively. Phytate and Phytase were about equally distributed between the two kernel halves (cross sections). During the early stages of germination (3 days), phytase activity did not change, and phytic acid content was reduced to 67%. After milling, most of the phytic acid and phytase activity were found in the bran fractions. It is concluded that substrate and enzyme are present in the same kernel structures, but separate within the cells. Extrusion cooking of rye whole flour at 100°C did not influence the phytic acid level, but caused a 23% reduction at 170°C. Phytase activity was reduced by 80% by extrusion cooking at 80°C. AA

- 3114 ANGER (H), DORFER (J) and BERTH (G). About molecular weight and viscosity number of arabinoxylan (pentosan) from rye (*Secale cereale*) and the derivation of the MARK-HOUWINK relation. *Nahrung*. 30(2); 1986; 205-8 (German)

Triticales

- 3115 SEHGAL (KL), BAJAJ (S) and SEKHON (KS). Studies on the composition, quality and processing of triticale. Part 3. Rheological and baking properties. *Nahrung*. 30(2); 1986; 155-9

Studies on rheological and baking properties of 14 promising strains of triticale and two check wheat varieties from India are reported. The farinograms obtained from triticale flours, in general, revealed poor dough development time and lower stability than those from wheat flours. The mean water absorption capacity of triticale flours was 54.3 % compared to 64.4 % of wheat flour. The triticale flour produced poor loaf volumes with mean value of 399 cm^3 compared to 475 cm^3 of wheat flour. Cookie baking tests showed that triticale flours were eminently suited for this purpose because of their soft flour and weaker gluten. Triticale whole meal required much less water for preparation of dough for chapatis and produced red coloured chapatis which tended to stale faster. AA

Wheat

- 3116 WILLIAMS (PC) and SOBERING (DC). Attempts at standardization of hardness testing of wheat. II. The near-infrared reflectance method. *Cereal Food World*. 31(6); 1986; 417-20

The collaborative study conducted for testing the hardness of wheat by near-infrared (NIR) spectroscopy resulted in establishing a tentative NIR index for the identification of wheat on the basis of hardness. The NIR index could be used on transferable calibration constants for all simple commercial NIR instruments with verification by reference samples. KAR

MILLETS

Ragi

- 3117 MALLESHI (NG), DESIKACHAR (HSR) and THARANATHAN (RN). Free sugars and non-starchy polysaccharides of finger millet (*Eleusine coracana*), pearl millet (*Pennisetum typhoideum*), foxtail millet (*Setaria italica*) and their malts. *Food Chem*. 20(4); 1986; 253-61

The aqueous ethanol extractable sugars and non-starchy polysaccharides of finger millet, pearl millet, foxtail millet and their malts were isolated and characterised. In comparison with native millets, the malted samples contained significantly higher levels of free sugars (glucose, fructose and maltose) and water-soluble non-starchy polysaccharides (WSNSP). The WSNSP isolated from malted samples were richer in hexoses than pentoses. The yield, as well as the qualitative and quantitative sugar profiles of the hemicellulosic polysaccharides, showed little variation between native and malted millets. AA

Sorghum

- 3118 AISIEN (AO), PALMER (GH) and STARK (JR). The ultrastructure of germinating sorghum and millet grains. *J. Inst. Brew*. 92(2); 1986; 162-7

PULSES

- 3119 CHOWDHURY (AR), TEWARI (SR), BANERJI (R), MISRA (G) and NIGAM (SK). Studies on leguminous seeds. II. Fette Seifen Anstrichm. 88(3); 1986; 99-101

The seeds from 11 plant species belonging to Caesalpiniaceae have been analyzed for fat, protein, fatty acid and mineral compositions. All the seed fats resembled the simple linoleic-oleic-palmitic type. AA

- 3120 ABDEL-AAL (E-SM), SHEHATA (AA), EL MAHDY (AR) and YOUSSEF (MM). Extractability and functional properties of some legume proteins isolated by three different methods. J. Sci. Food Agric. 37(6); 1986; 553-9

The present study was conducted on faba beans, chick peas and fenugreek to investigate the efficiency of three methods of extraction and three methods of precipitation: protein isoelectric precipitation (PIP), protein micellar mass (PMM) and partially hydrolysed protein preparation (PHP) in terms of nitrogen recovery, purity and function of the resultant protein isolates. Two of the protein isolates had higher values of water absorption and fat absorption compared to their corresponding parent flours, with fenugreek bring the exception. The PHP isolate had the highest nitrogen solubility index values at pH 2.4 followed by PMM at pH 5.7-6.4 and finally PIP at pH 4.5-5.5 KAR

- 3121 HAMZA (MA), EL-TABEY SHEHATA (AM) and STEGEMANN (H). Studies on - amylase and trypsin inhibitors in legume seeds using agar diffusion and isoelectric focusing techniques. Qual. Plant. Plant Foods Hum. Nutr. 36(2); 1986; 139-46

Amylolytic and tryptic inhibitors of faba bean extracts were determined by an agar diffusion test. The amylolytic inhibitor had protein characters. Furthermore, water-soluble trypsin inhibitors of Cicer arietinum, Lens esculenta, Lupinus termis, Phaseolus vulgaris, Pisum sativum, Trigonella foenum-graecum and Vicia faba which were separated by polyacrylamide gel isoelectric focusing (PAGIF) in thin-layers, showed species specific patterns. Negative staining showed 10 bands for French beans, 9 for fenugreek seeds, 8 for lentils and chickpeas, 7 for peas and 6 for faba beans. Lupin seeds were free from trypsin inhibitors. Treatments (soaking, germination and heat processing) of faba beans reduced the number of trypsin inhibitors of PAGIF patterns, less after soaking and germination, but more after roasting and frying. No inhibitors were detected after cooking. AA

- 3122 SHAMANTHAKA SASTRY (MC) and MURRAY (DR). The tryptophan content of extractable seed proteins from cultivated legumes, sunflower and Acacia. J. Sci. Food Agric. 37(6); 1986; 535-8

The total salt-extractable protein from seeds of important cultivated legumes and sunflower kernels has a tryptophan content ranging from 0.91% (by weight) for chickpea (Cicer arietinum) to 1.99% (by weight) for green gram (Vigna radiata). In species with substantial albumin fractions, the tryptophan content of the albumin fraction is higher than that of the globulin fraction by factors ranging between 2.3 (pigeon pea, Cajanus cajan) and 20.3-fold (pea, Pisum sativum, cv. Telephone). Although the protein content of Acacia seeds is relatively low (5-14% of seed weight), the tryptophan content of Acacia seed proteins is usually greater than that of the cultivated legumes (1.50-2.66%, by weight). AA

- 3123 SCHNEIDER (CH), SCHULTZ (M), SCHMANDKE (H) and LUDER (R). Preparation of broad bean (*Vicia faba* L. minor) products. Part 2. Broad bean protein isolates from seed flour in the pH range below the isoelectric point. *Nahrung*. 30(2); 1986; 199-203

Broad bean protein isolates in aqueous solutions form stable gels after heating at pH values below the isoelectric point (pH 2-3) if they are extracted at the same pH. But the acid extraction is a time-consuming and expensive process. This paper outlines a new and simple procedure for the preparation of broad bean protein isolates in the acid pH range. It consists of a short extraction of seed flour at pH 7.5 (30 minutes) followed by an after-treatment at pH 2-3 (60 minutes) and gives the highest yield of acid treated broad bean protein isolates after a sudden acidification. AA

Brown beans

- 3124 LOWGREN (M) and LIENER (IE). The effect of slow-cooking on the trypsin inhibitor and hemagglutinating activities and in vitro digestibility of brown beans (*Phaseolus vulgaris*, var. Stella) and kidney beans (*Phaseolus vulgaris*, var. Montcalm). *Qual. Plant Plant. Food Hum. Nutr.* 36(2); 1986; 147-54

Brown beans and kidney beans were subjected to two modes of cooking in a household slow cooker: (A), a fixed low setting for 10 hours, and (B), a high setting for 2.5 hours and a low setting for 7.5 hours. Temperature changes in the beans were recorded. With treatment A over 90% of the hemagglutinating and trypsin inhibitor activities occurred after 6 hours at which time the temperature had reached 80°C. With treatment B inactivation of these activities was almost complete at the end of 2 hours when a maximum temperature of 100°C had been attained. The in vitro digestibility of the bean protein was considerably increased by either treatment. By way of contrast, only 20 minutes of heating was required to destroy these activities when the beans were brought to a boil in an open vessel. AA

Cowpeas

- 3125 LAURENA (AC), GARCIA (VV) and MENDOZA (EMT). Effects of soaking in aqueous acidic and alkali solutions on removal of polyphenols and in vitro digestibility of cowpea. *Qual. Plant. Plant Food Hum. Nutr.* 36(2); 1986; 107-18

Mature dark red seeds of cowpea (*Vigna unguiculata* (L.) Walp.) UPL Cp 3, were subjected to several soaking treatments to remove their polyphenols. Soaking in water at room temperature for 8 and 24 hours resulted in 17% and 21% loss of assayable polyphenols, respectively. Dilute solutions of alkali (Na_2CO_3 , NaHCO_3 , NH_4OH and KOH) and acid (CH_3COOH , HCl and H_2SO_4) were more effective in removing polyphenols up to 88% than higher concentrations of alkali and acid solutions. Vinegar (0.005-0.65 M CH_3COOH) decreased polyphenols from 55 to 62% with a 6 to 14% improvement in in vitro protein digestibility (IVPD). Commercial lime (65% CaO) removed polyphenols from seeds soaked for 8 to 24 hours by 70% with 2 to 10% increase in in vitro protein digestibility. Ash removed 40 to 60% of the polyphenols after 8 and 24 hours of soaking with an increase in IVPD of 7 to 13%. Total polyphenols were significantly correlated (+0.92) with protein precipitable polyphenols (condensed tannins). AA

Lentils

- 3126 MOHARRAM (YG), ABOU-SAMAHA (AR) and EL-MAHADY (AR). Effect of cooking methods on the quality of lentils. *Z. Lebensmittel-Unters. Forsch.* 182(4); 1986; 307-10

The effect of cooking lentil seeds by different methods on the

physical, chemical and nutritional properties were studied. It was found that soaking of the seeds, followed by drying and then traditional cooking, or cooking in the presence of NaHCO_3 , improve the technological properties, texture and nutritional value more than cooking directly in tap-water or in diluted citric acid solution. AA

Peas

- 3127 GAZE (RR), ATHERTON (D) and HOLDSWORTH (SD). Suitability of the Ottawa Pea Tenderometer to assess the quality of raw peas. J. Food Technol. 21(3); 1986; 319-29

This paper gives an account of the relationship obtained between the force readings for samples of peas using the Martin Pea Tenderometer, the Ottawa Pea Tenderometer and the Instron 1140 used with an Ottawa Pea Tenderometer food cell, together with sensory quality of canned and frozen peas and alcohol insoluble solids. The effect of temperature on the readings obtained for the different instruments, and the effect of interchangeability of Ottawa Pea Tenderometer cells and components are also reported together with information concerning the influence of bruising and damage to a sample of peas. AA

Phaseolus vulgaris

- 3128 BOUFASSA (C), LAFONT (J), ROUANET (JM) and BESANCON (P). Thermal inactivation of lectins (PHA) isolated from Phaseolus vulgaris. Food Chem. 20(4); 1986; 295-304

The aim of the work described in this paper was to determine the pattern of loss of carbohydrate binding ability in the course of thermal processing of lectins purified from Phaseolus vulgaris. Thermal inactivation of aqueous solutions of pure PHA occurred according to a biphasic first order mechanism. The first-order rate constants appeared to be dependent on pH and divalent cations. All different subunits constituting the whole PHA were inactivated at the same rate. KAR

Pigeon peas

- 3129 SALUNKHE (DK), CHAVAN (JK) and KADAM (SS). Pigeon pea as an important food source. CRC Crit. Rev. Food Sci. Nutr. 23(2); 1986; 103-45

Discusses: classification, origin, production and distribution; chemical composition; antinutritional factors; storage; and processing and utilization of pigeon pea. BSN

- 3130 NARASIMHA CHARY (S) and BHALLA (JK). Mineral and trace element composition in induced mutants of pigeon pea (*Cajanus cajan* (L.) millsp.). Qual. Plant. Plant Foods Hum. Nutr. 36(2); 1986; 82-92

In the present investigation several mutants isolated during mutagenic studies of pigeon pea were analysed for Ca, Mg, Fe, Zn, Cu, Mn, Cr, Ni. The results have revealed changes in the concentrations of macro and micro mineral elements in the mutant seed material. These changes in concentrations are attributed to the altered genetic structure; due to mutations, the plant system might have absorbed and stored more 'or' less amounts of the elements in the seeds. AA

Winged beans

- 3131 FERNANDO (T) and BEAN (G). The reduction of antinutritional behenic acid in winged bean (*Psophocarpus tetragonolobus* L. DC) seeds. Qual. Plant. Plant Foods Hum. Nutr. 36(2); 1986; 93-6

Eight winged bean seed varieties were treated by two methods, autoclaving and soaking, to investigate their respective effects on the antinutritional behenic acid in winged bean seeds. Either method was able to completely destroy behenic acid. Thirty minute auto-

claving reduced the behenic acid content up to 5%, and 60 minutes autoclaving reduced by 15%. Soaking in water in 2 hours did not make any change in behenic acid content in any of the varieties, while 20 hours soaking reduced it by 1.5%. AA

OILSEEDS AND NUTS

- 3132 LEMPANNA (C). Production prospects of oilseeds during the eighties. *Pesticides*. 20(5); 1986; 15-0

Canola

- 3133 MA (AYM) and OORAIKUL (B). Optimization of enzymatic hydrolysis of canola meal with response surface methodology. *J. Food Process. Preserv.* 10(2); 1986; 99-113

Cottonseeds

- 3134 JOHNSON (LA), FARNSWORTH (JT), SADEK (NZ), CHAMKASEM (N), LUSAS (EW) and REID (BL). Pilot plant studies on extracting cottonseed with methylene chloride. *J. Am. Oil Chem. Soc.* 63(5); 1986; 647-52

The practical feasibility of using methylene chloride to extract oil, aflatoxin and gossypol simultaneously from cottonseed flakes was demonstrated in a 56 hour experimental run using a pilot-scale, continuous extractor. Nine different trials varying in extraction time, solvent:flake ratio, flake preparation method and blending with 5% ethanol were evaluated. Residual oil contents were lower than typically achieved in extraction with hexane. Aflatoxin contents of the meals were reduced by 73-92% of the level in cottonseed meals, making possible the upgrading of a large portion of cottonseed meal that otherwise would exceed current action levels. Because gossypol also was extracted, it was possible to produce cottonseed meal that was well suited for use in poultry feeds, especially when a blend of 5% ethanol in methylene chloride was used. Meal desolventized easily, and residual levels of methylene chloride were generally less than 12 ppm. The oil was refined and bleached to acceptable quality standards, and no residual aflatoxin was detected in alkali-refined oil. AA

- 3135 LEE (LS), LEE (LV) Jr. and RUSSELL (TE). Aflatoxin in Arizona cottonseed: Field inoculation of bolls by *Aspergillus flavus* spores in wind-driven soil. *J. Am. Oil Chem. Soc.* 63(4); 1986; 530-32

Conditions typical of an Arizona monsoon were mimicked in the field to inoculate cotton plants with *Aspergillus flavus*. Spores, mixed with autoclaved local soil, were blown onto cotton plants having bolls at all stages of maturity, using a modified commercial leaf blower. Half the plants were sprayed with water following inoculation. After one month, plants were pulled and the position of bolls mapped. All bolls were examined for bright-green-yellow fluorescence (BGYF) of lint, and ginned seeds from each boll were assayed for aflatoxin. Control non-wetted, non-inoculated bolls had no BGYF lint and no aflatoxin-containing seed. In contrast, 15% of the bolls from wetted, inoculated plants exhibited BGYF; 18% of these BGYF bolls had toxin. Only 3% of the non-wetted bolls had BGYF lint and none contained toxin. Lower bolls (fully fluffed at inoculation) were not infected, nor were upper bolls (flower stage at inoculation). Infection occurred only in bolls that had opened during the 30 days following inoculation. While the position of BGYF bolls on naturally contaminated plants was the same as for the inoculated, the ratio of toxic

bolls to BGYF bolls was different. All BGYF bolls from plants naturally contaminated with *A. flavus* contained aflatoxin. AA

- 3136 KOLTUN (SP). Aflatoxin inactivation of undelinted cottonseed by ammoniation. *J. Am. Oil Chem. Soc.* 63(4); 1986; 533-4

Preliminary work is presented on treatment with gaseous ammonia of undelinted (fuzzy) cottonseed containing an average of 1,500 µg/kg total aflatoxins. These seed were treated with 4% anhydrous ammonia (w/w) for 30 minutes at temperatures ranging from 66 C to 82 C. The data obtained in this study indicate that inactivation of aflatoxins in undelinted whole cottonseed may be accomplished using processing conditions comparable to those proposed for cottonseed meal. AA

- 3137 YATSU (L), JACKS (TJ), KIRCHER (HW) and GODSHALL (MA). Chemical and microscopic studies of the matrix substance in pigment glands of cotton (*Gossypium hirsutum* L.) seeds. *J. Am. Oil Chem. Soc.* 63(4); 1986; 534-7

Cottonseeds contain gossypol, a toxic substance, that renders the otherwise nutritious seeds inedible. However, because the gossypol is concentrated in small, intercellular glands, it is possible to separate gossypol from other seed constituents by pulverizing the seeds and removing the glands. This procedure is practicable because gossypol remains with the glands even during seed pulverization and manipulation in hexane. Many believe that the gossypol remains within the glands because the glands are virtually indestructible, protected by tough, resilient "plates". However, we show that most of the isolated glands are broken after comminution. The gossypol is held in a water-soluble matrix within the lumen of the glands. Analysis of aqueous extracts of isolated glands showed that the bulk of the extract is a non-dialyzable arabinogalactan. We suggest that the matrix substance is an arabinogalactan. AA

Cucurbita seeds

- 3138 AKIHISA (T), GHOSH (P), THAKUR (S), ROSENSTEIN (FU) and MATSUMOTO (T). Sterol compositions of seed and mature plants of family cucurbitaceae. *J. Am. Oil Chem. Soc.* 63(5); 1986; 653-8

Groundnuts

- 3139 SHANTHA (T), SREENIVASA MURTHY, RATI (ER) and PREMA (V). Detoxification of groundnut seeds by urea and sunlight. *J. Food Safety.* 7(4); 1986; 225-31

A fourteen hour exposure to sunlight destroys about 90 and 77% aflatoxin B₁ added to groundnut flakes with and without fat, whereas only about 50% of the toxin is destroyed when present as a natural contaminant. Treating the groundnut flakes with 20% urea and 2% soybean flour (a source of urease) at 50% moisture would bring about 70% destruction of aflatoxin B₁; In large scale trials, destruction was about 85%. Treatment with urea does not bring down the PER value of the material, which is 1.5 after treatment as against 1.6 in the untreated groundnuts. AA

Rapeseeds

- 3140 DAUN (JK). Glucosinolate levels in Western Canadian rapeseed and canola. *J. Am. Oil Chem. Soc.* 63(5); 1986; 639-43

- 3141 DOCK (H D), MIETH (G), OHFF (R), KESTING (S), HEINZ (T) and KREIENBRING (F). Nutritive value of heat-treated rape extraction meal from winter rape varieties poor in erucic acid and glucosinolate. Experiment showing albino rats and broilers. *Nahrung.* 30(2); 1986;

177-89 (German)

Extraction meal from a winter rape variety poor in erucic acid and glucosinolate, harvested in 1982 and 1983 were subjected to different steam heating regimes under laboratory conditions. Compared to industrial meal from rape seed of standard grade and to untreated meals from rape seed of 00 quality a heat treatment proved to be favourable as to the wished improvement of the feed value with application to rats and broilers. Test groups fed rape extraction meal steamed under optimal conditions came up in essential test criteria to the control group fed soya extraction meal. AA

Soybeans

- 3142 HERMANSSON (A-M). Soy protein gelation. J. Am. Oil Chem. Soc. 63(5); 1986; 658-66

The two soy proteins, glycinin and conglycinin both have the ability to form ordered structures consisting of strands 10-15 nm thick. The glycinin gel strands formed in distilled water are regular, and cross sections of strands showed a hollow cylindrical structure. In the presence of sodium chloride, glycinin forms an aggregated gel structure at 85°C, but at 95°C a regular structure similar to that found in distilled water was formed. The aggregated structure was interpreted as a transient state similar to the soluble aggregate formed on heating dilute solutions prior to dissociation into subunits. Conglycinin gels are more irregular and more cross-linked than gels of glycinin. Also, the strands of conglycinin showed a complex mode of aggregation possibly in the form of double spirals. The addition of salt does not affect the microstructure of conglycinin gels as dramatically as in the case of glycinin gels. Commercially produced soy protein isolates may behave quite differently from native soy proteins, due to processing conditions causing denaturation and various states of aggregation. AA

- 3143 SESSA (DJ) and BIETZ (JA). Toasted soybean flour components with trypsin inhibitor activity. J. Am. Oil Chem. Soc. 63(6); 1986; 784-8

Compounds in toasted soybean flour having trypsin inhibitor (TI) activity were isolated and characterized. Sodium hydroxide (0.01N) extracts of toasted soybean flour had an average of 2.59 mg TI/g sample. These extracts, after trichloroacetic acid (TCA) precipitation and dialysis, yielded supernatant and precipitate fractions. Addition of polyvinylpyrrolidone to eliminate free tannins and phenolics in the extracts, which may lead to over estimation of TI activity, was unnecessary. Material balance studies revealed 91% protein recovery and 92% recovery of TI activity in the TCA supernatant (1.1% protein, 2.0% TI) and precipitate (87.0% protein, 90.0% TI) fractions. Column chromatography and electrophoresis showed the TCA supernatant and precipitate fractions to contain proteins, including those having TI activity. Kunitz type TI and Bowman-Birk type protease inhibitors accounted for most residual TI activity of toasted soybean flour, as verified by column chromatography, isoelectric focusing, sodium dodecyl sulphate polyacrylamide electrophoresis, and size-exclusion high performance liquid chromatography, using the two similarly treated protease inhibitors as standards. Immunoblotting was also used to detect and identify Kunitz type TI's in toasted soybean meal extracts. This study established the proteinaceous nature of residual trypsin inhibitor activity in toasted soybean flour and the presence of both Kunitz and Bowman-Birk inhibitors. AA

- 3144 ANG (HG), KWIK (WL), LEE (CK) and THENG (CY). Ultrafiltration studies of foods: Part 1. The removal of undesirable components in soymilk and the effects on the quality of the spray-dried powder. Food Chem. 20(3); 1986; 183-99

Use of membrane having a 20,000 molecular weight cut off, the rejection rates of the oligosaccharides and phytic acid increased during ultrafiltration. At 60% water removal, over 80% of each of the oligosaccharides was removed. In the case of phytic acid, however, only 50% could be removed. The nitrogen solubility index of the spray dried powder improved with per cent water removal during ultrafiltration and also by the addition of sucrose to the concentrate prior to drying. KAR

TUBERS AND VEGETABLES

- 3145 POULSEN (KP). Optimization of vegetable blanching. *Food Technol.* 40(6); 1986; 122-9

Purpose of blanching; traditional blanching in industry; new principles in blanching; steam blanchers; water blanchers; leaching of solubles during blanching and cooling; integration of blanching-cooling, and the problems solved by blancher-cooler are the aspects covered. KAR

- 3146 WILLIAMS (DC), LIM (MH), CHEN (AO), PANGBORN (RM) and WHITAKER (JR). Blanching of vegetables for freezing. Which indicator enzyme to choose. *Food Technol.* 40(6); 1986; 130-40

Problems associated with the use of peroxidase for blanching vegetables; effect of enzymes on aroma development; heat stabilities of enzymes in green peas; and rapid assay for lipoxygenase are the aspects covered. KAR

Carrots

- 3147 LEE (CY). Changes in carotenoid content of carrots during growth and post-harvest storage. *Food Chem.* 20(4); 1986; 285-93

During post harvest storage at 2 C and 90% RH, the levels of alpha- and beta-carotene, which made up over 85% of the total carotene, increased slowly during the first 100-day storage, but decreased thereafter. Treatment of carrots with 2-(4-chlorophenylthio) triethylamine HCL (CPTA) resulted in reduction of total carotenoids and inhibited the enzymatic cyclization of neurosprene with concomitant increase in the lycopene content during storage. KAR

- 3148 VAROQUAUX (P), VAROQUAUX (F) and TICHIT (L). Loss of nitrate from carrots during blanching. *J. Food Technol.* 21(3); 1986; 401-7

Loss of nitrate from carrots during blanching was studied using several parameters, such as temperature of water, thickness of carrot slices, and volume ratio of carrots and water. It was found that the kinetics of nitrate diffusion fitted well to the Fick's general diffusion equation. Surface mass transfer coefficient (K) was related to temperature by an Arrhenius type reaction. The values of activation energy (E_a) and the constant K_0 were calculated as 74 kJ/mole and $2769 \times 10^3 \text{ kg/m}^2/\text{sec}$. As expected the initial rates of diffusion were proportional to carrot surface and the efficiency of nitrate removal decreased with increasing blancher load. The proposed model may be used to determine the optimum blanching conditions of carrots in the baby food industry. AA

Cassava

- 3149 HIROSE (S). Physiological studies on postharvest deterioration of cassava roots. *JARQ.* 19(4); 1986; 241-52

Two types of deterioration one is physiological (PD) and another microbiological deterioration (MD) were observed. Varietal differences

ces in PD was seen more clearly and earlier in tissue blocks than intact roots. The degree of PD was negatively correlated with moisture content of roots at harvest and positively correlated with the starch content. Pruning, leaving only 30 cm of stem, practiced 2-3 weeks before harvest or burying roots underground for 3 weeks was effective in delaying the occurrence of PD. KAR

Potatoes

- 3150 SHAKYA (BR) and FLINK (JM). Dehydration of potato. 3. Influence of process parameters on drying behaviour for natural convection solar drying conditions. *J. Food Process. Preserv.* 10(2); 1986; 127-43

Conditions for conducting laboratory stimulations of natural convection solar-drying were investigated. In the solar-drying experiments, air speed in the empty drying chamber (called the air flow potential, AFP) varied from 1.3 to 1.8 m/s, while inlet temperature to the loaded drying tower varied from 57 to 71 °C. In laboratory simulations of solar-drying, the influence of variation of air flow rate, product loading density and inlet air temperature on drying behaviour of potato sticks (12.5 x 6 x 40 mm) was investigated. It was determined that potato sticks could be solar-dried in 5-6 hours to a water activity of 0.7 (15 g water/100 g solids) under natural convection conditions. Drying rate increased with increase of inlet air temperature and/or AFP, with the effect of AFP being most noticeable at the beginning of the drying process. The time required to remove 96% of the original moisture varied by $\pm 5\%$ for the AFP variation noted in solar-drying (1.34 ± 0.23 m/s) and varied $\pm 10\%$ for the variation of inlet air temperature noted in solar-drying ($65 \pm 5^\circ\text{C}$), indicating higher sensitivity for natural convection solar-drying to variability of inlet air temperature than fluctuating AFP. The ratio of increase in drying time to increase a bed depth is less than 1, so overall dryer productivity increased with increasing bed depth. AA

- 3151 SHAKYA (BR), MOLEDINA (EH) and FLINK (JM). Dehydration of potato. 4. Influence of process parameters on ascorbic acid retention for natural convection solar drying conditions. *J. Food Process. Preserv.* 10(2); 1986; 145-59

Yams

- 3152 MOHR (E) and WICHMANN (G). Composition of the yam root. *Gordian* 86(4); 1986; 72 (German)

Yam (*Dioscorea alata* Linn.) roots grown in the Philippines are used as flour as well as thickener; and also for the colouration and aromatization of alcoholic beverages and ice-cream, and the preparation of puddings, baked goods, marmalades, and "natta". The composition of the root is reported to be: edible portion 83%; moisture 74.9%; carbohydrates 22.2%; crude protein 1.7%; ash 1%; crude fibre 0.7%; fat 0.2%; mineral and vitamin contents are: phosphorus 44, calcium 19, iron 0.7, thiamine 0.09, riboflavin 0.02, and niacin 0.5 mg/100 g. EMD

Brinjals

- 3153 AWASTHI (MD). Chemical treatments for the decontamination of brinjal fruit from residues of synthetic pyrethroids. *Pestic. Sci.* 17(2); 1986; 89-92

Dip treatment of fruit in detergent solution removed 50-60% of surface residues as against 40-45% removed by hydrolytic degradation with alkali solution. The effect of washing decreased progressively with increased aging of residues. AA

Pumpkin

- 3154 ACHINEWHU (SC). Some biochemical and nutritional changes during the fermentation of fluted pumpkin (*Telferia occidentalis*). Qual. Plant. Plant Foods Hum. Nutr. 36(2); 1986; 97-106

The pH, soluble nitrogen, soluble solids and titratable acidity increased during a 6 day fermentation of fluted pumpkin seeds. Gas liquid chromatographic analysis of trimethylsilyl (TMS) derivatives of carbohydrates extracted from the seeds showed that the unfermented seeds contained mostly sucrose with a low content of flatus-oligosaccharides, raffinose and stachyose. There were also high contents of fructose and galactose. Fermentation increased the total monosaccharides with high content of glucose and some unidentified monosaccharides. Fermentation decreased the total oligosaccharide, eliminated raffinose and stachyose and increased the content of maltose. Except for a slight decrease in total saturated and increase in total unsaturated fatty acids, fermentation had no effect on fatty acid composition. AA

Tomatoes

- 3155 MADIAIAH (N), RADHAKRISHNAIAH SETTY (G), KRISHNA PRAKASH (MS), NANJUNDA SWAMY (AM) and PATWARDHAN (MV). Studies on the physico-chemical characteristics of some new tomato varieties for their suitability for preparing tomato paste. Indian Food Packer. 40(3); 1986; 6-12

Twenty four new varieties of tomatoes grown in Bangalore area of Karnataka State (India) were assessed for their physico-chemical characteristics (shape, diameter, fruit weight, juice yield, juice colour, soluble solids, acidity, pH, pulp content, ascorbic acid, yield of paste and lycopene) to find out their suitability for tomato paste preparation. Based on the data obtained, varieties LEC 129604/75/122, EC 129606/(ARND) and Selection-4 were rated as the best for juice yield, tomato paste yield, colour, appearance, lycopene content and acidity. Preference for suitability in the descending order was observed for the following four varieties of tomatoes EC 154894/E6972, EC 130038/SANTA, EC 135501/JM4107 and EC 126757/BONES-DI. BSN

- 3156 VIJAY SETHI and ANAND (JC). Quality characteristics of hybrid tomatoes for puree preparation. Indian Food Packer. 40(3); 1986; 13-9

Eight hybrid tomato varieties were evaluated for physicochemical characteristics (shape, size, number of locules, weight, juice yield, colour, total solids, soluble solids, sugar (total and invert) ascorbic acid, sugar acid ratio, β -carotene, lycopene), to assess their suitability for puree preparation. Results have shown that Shital var. had high ascorbic acid content, while Indoprocess III showed high lycopene and carotene content. The % total solids, soluble solids and acidity ranged from 4.10-6.42, 3.80-4.62 and 0.33-0.48 respectively in the eight hybrids examined. Indoprocess II was found best among the puree preparation, followed by Indoprocess III and Rupali. BSN

- 3157 UPASANA RANI and BAINS (GS). Evaluation of consistency of ketchups by the blotter test. Indian Food Packer. 40(3); 1986; 20-24

Seven brands of commercially available Indian Ketchups and two samples prepared from cold break as well as hot break from two varieties ((i) Pb. Chuhara and (ii) Pb. Kesri) of tomatoes were examined for their consistency by blotter test (the modified test was used employing an inverted container filled with the sample unlike the suggested procedure of dropping a spoonful of ketchup on the blotter). The outer limit of the seeped liquid was marked at different intervals upto a max. of 30 minutes. The diameter of the circular boundary of

the advancing fluid at various intervals was measured. Results have shown that ketchups prepared from cold pressed juice with or without homogenization had a similar seepage pattern which exceeded those prepared by hot break method. Commercial ketchups showed varying degrees of seepage of liquid. BSN

Truffles

- 3158 SENESI (E), MAESTRELLI (A) and TESTONI (A). Some aspects of the technological transformation of white truffles (*Tuber magnatum* Pico). Ind. Aliment. 25(4); 1986; 296-9 (Italian)

The results of some experiments on the long and short term storage of white truffles are referred. The truffles, wrapped in a shrinkable package and stored in a cold room (0 C) for 28 days, showed a very small weight loss with respect to the unwrapped ones (2.4 and 16.3% respectively). Freezing confirmed its suitability for the maintenance of good organoleptic characters of white truffles during a 12 months storage at -20 C. The enzymatic liquefaction, followed by vacuum drying, allowed the production of a strongly flavoured and easily soluble white truffle powder. AA

FRUITS

- 3159 DULL (GG). Nondestructive evaluation of quality of stored fruits and vegetables. Food Technol. 40(5); 1986; 16-10

Various non-destructive techniques evaluated include deformation - compression, acoustic impulse, resonance frequency, ultrasound, dielectric properties, X-ray, fluorescence, delayed light emission, reflected radiation and transmitted radiation. KAR

Apricots

- 3160 PIVA (M), LERICI (CR) and DALLA ROSA (M). Non enzymatic browning (NEB) in stored fruit derivatives. Ind. Aliment. 25(4); 1986; 277-83 (Italian)

Temperature and water activity (a_w) are the main factors affecting non enzymatic browning reactions (NEB) in food systems. Samples of apricot puree at different a_w s were treated for different time-periods and temperatures (50, 65 or 90°C for 15, 30 or 60 minutes) and the results are reported in this work. The degree of browning has been detected at the end of the heat treatment and during storage at room temperature. The shelf-life has been calculated by considering 2% of CO_2 in the headspace of the sample as a limit of acceptability in regard to browning reactions. AA

Apples

- 3161 DIENER (RG), ELLIOTT (KC), NESSELROAD (PE), ADAMS (RE), BLIZZARD (SH), INGLE (M) and SINGHA (S). Bulk handling of processing apples in the orchard. J. Agric. Eng. Res. 33(3); 1986; 205-11

A bulk handling system for mechanically harvested apples was developed. The fruit was removed from the harvester and conveyed into a trailer which was towed behind. An air bag system was used to lower the fruit into the trailer. When the trailer was loaded, it was transported to a processing plant where the fruit was unloaded using a water handling system. The new system effectively simplified the handling of fruit and eliminated the use of bins. No additional trim loss due to bruising was observed since the fruit was processed immediately. AA

Bananas

- 3162 THOMAS (P). Radiation preservation of foods of plant origin. III. Tropical fruits: bananas, mangoes and papayas. *CRC Crit. Rev. Food Sci. Nutr.* 23(2); 1986; 147-205

Discusses: Inhibition of ripening by irradiation of banana, mango and papaya; heat radiation combination treatments for disease control in tropical fruits; irradiation as a quarantine treatment for tropical fruits; metabolic changes in irradiated fruits; biochemical mechanisms of delayed ripening by irradiation; organoleptic qualities of irradiated fruits; transportation studies with irradiated fruits; wholesomeness of irradiated fruits; test marketing and consumer acceptance studies; and commercial prospects for irradiation of tropical fruits. BSN

Citrus

- 3163 SUHA SUKAN (S) and YASIN (BFA). SCP production from citrus wastes by using constituted mixed fungal inoculum. *Process Biochem.* 21(2); 1986; 50-53

Mangoes

- 3164 MEDLICOTT (AP), REYNOLDS (SB) and THOMPSON (AK). Effects of temperature on the ripening of mango fruit (*Mangifera indica* L. var. Tommy Atkins). *J. Sci. Food Agric.* 37(5); 1986; 469-74

Mango fruits were stored at 12, 17, 22, 27, 32 and 37°C for 10-16 days. At 12°C fruits did not ripen to full eating quality upto 16 days, acid levels were higher, they retained some green colouration, had lower pulp carotenoids and showed incomplete softening. After 15 days at 17°C fruits had softened and degreened to an acceptable level but had a poor pulp colour; they were high in acids as well as in sugar. At 22-32°C all fruits showed the development of good quality characteristics of high chlorophyll breakdown, high pulp carotenoids, a good texture and a balanced sugar:acid ratio. Similar characteristics were shown at 37°C but the peel generally appeared mottled and the pulp had slightly low sugar acid ratio. KAR

Melons

- 3165 ACHINEWHU (SC) and RYLEY (J). Effect of fermentation on the thiamin, riboflavin and niacin contents of melon seed (*Citrullus vulgaris*) and African oil bean seed (*Pentaclethra macrophylla*). *Food Chem.* 20(4); 1986; 243-52

Detection by an automated thiochrome method and high performance liquid chromatography with fluorescence detection has indicated that fermentation significantly increased the content of thiamin, riboflavin and niacin in African oil bean seeds and thiamin and riboflavin in melon seeds. KAR

Pears

- 3166 UPASANA RANI and BHATIA (BS). Studies on Bagugosha pear for preserve and a ready-to-eat product. *Indian Food Packer.* 40(3); 1986; 25-31

Process details of Bagugosha pear preserve and a ready-to-eat, intermediate moisture product are described. For the preserve, the pear is peeled, cored, diced and blanched in hot water at 90°C for 3 minutes before stepped up syruping to 70-72 Brix. Slices for ready-to-eat produce were blanched similarly but using syrup containing 12.5% sugar, 42.5% glycerol, 15% water and 200 ppm of potassium meta-

bisulphate, followed by equilibration overnight. Both the products had excellent texture and characteristic Bagugosha flavour highly commended by the consumer panel. Preserves packed in glass jars and the intermediate moisture product in polyethylene bags showed satisfactory shelf-life for about 40 weeks under ambient conditions. AA

Prunus

- 3167 SCHMID (W) and GROSCH (W). Identification of highly aromatic volatile flavour compounds from cherries (*Prunus cerasus* L.). Z. Lebensmittel Unters Forsch. 182(5); 1986; 407-12 (German)

Flavour compounds were isolated from sour cherry (*Prunus cerasus* L.) juice by simultaneous distillation/extraction (extract I), and by vacuum distillation followed by extraction of condensate (extract II). Both extracts were freed from acids, fractionated, and then analyzed by high-resolution gas chromatography (HRGC). 28 flavour compounds were identified in extract I and 18 in extract II; 16 of the latter were present in I also. Seven compounds common to I and II had the highest aroma values; namely: benzaldehyde, linalool, hexanal, 2(E)-hexenal, phenyl acetaldehyde, 2(E), 6(Z)-nondienal, and eugenol. Extract I contained, in addition, a flavour compound of high aroma value, but of unknown structure. KMD

SUGAR, STARCH AND CONFECTIONERY

Sugars

- 3168 PACHMAYR (O), LEDL (F) and SEVERIN (T). Formation of 1-alkyl 3-oxypyridiniumbetaines from sugars XXI. Investigations relating to the Maillard reaction. Z. Lebensmittel-Unters Forsch. 182(4); 1986; 294-7

When heating pentoses, hexoses and disaccharides with primary amines 1-alkyl-3-oxypyridiniumbetaines 5 are formed. From reaction mixtures of sugars with N-acetyllysine as a model of peptide-bound lysine, the betaine with structure 6a was isolated. The formation, reactivity and determination of these compounds in foods are discussed. AA

Honeys

- 3169 HEITKAMP (K) and BUSCH-STOCKFISCH (M). Honey: The pros and cons. Are statements about the physiological effects of honey based on fact? Z. Lebensmittel-Unters. Forsch. 182(4); 1986; 279-86

- 3170 KLEIN (E), WEBER (W), HURLER (E) and MAYER (L). Gas-chromatographical determination of isopropyl-4, 4'-dibromobenzilate (Bromine propylate), 4,4'-dibromo benzophenone and various acaricides in honey and honeycomb wax. Dtsch. Lebensmittel-Rundschau. 82(2); 1986, 185-8 (German)

A method is presented for the determination of residues of isopropyl-4,4'-dibromobenzilate (bromopropylate; BP) and its main degradation product 4,4'-dibromobenzophenone (BBP) in honey and in the wax of honeycombs. The active substance BP contained in the "Folbex VA neu" - fumigant strip and BBP are vapourized during the treatment against mite infestation in bees caused by the varroa mite. Due to its lipophilic properties BP and BBP can be detected in the wax of honeycombs. AA

Starches

- 3171 JAKOVljeVIC (JB), NIKOLOV (ZL) and BOSKOV (ZM). Some analytical aspects of enzyme degradation of starch and inulin into malto- and

fructooligosaccharides. *Nahrung*. 30(2); 1986; 171-6

Confectionery

- 3172 STUMPF (DM). Selected particle size determination techniques. *Manuf. Confect.* 66(6); 1986; 111-4

Discusses: Micrometer; microscope; computer based image analysis using microscope images, sieving; coulter counter, particle size by sedimentation; and particle size by laser scattering. BSN

- 3173 MITCHELL (NE). Changes in the confectionery market in the next decade. *Manuf. Confect.* 66(3); 1986; 47-9

Chocolates

- 3174 PIEPER (WE). Chocolate viscosity. *Manuf. Confect.* 66(6); 1986; 117-20

Discusses: comparison survey; Man-Michael conversion values; low shear rate values; value of constant "K"; official method; Casson model; modification of the Casson model; and instrument calibration with a standard fluid. BSN

- 3175 LAUT (R). Microprocessor controlled chocolate tempering and coating. *Manuf. Confect.* 66(6); 1986; 129-132

BAKERY PRODUCTS

- 3176 SPICER (G). Report on the 36th Convention for Bakery Technology. *Dtsch. Lebensmittel-Rundschau*. 82(4); 1986; 119-23 (German)

Summaries of 19 papers presented at the Convention are printed here: SEIBEL (W), BRUMMER (J-M) and MORGENSTERN (G) Experiences with milled cereal products of the 1985 harvest; GERMAN (H) and MEUSER (F) - Energy and product optimization by climate control in a through-put baking oven; DALHEIMER (W) - The baking of stone oven bread - today; STEPHAN (H), BRUMMER (J-M) and WEIPERT (D) Possibilities of the use of triticale in the bakery; PICCIONI (G) - Artisanal production of fresh paste goods; BRUMMER (J-M), STEPHAN (H), MORGENSTERN (G) and NEUMANN (H) - Production of crisp rolls; REINS (W) Small scale baking (in the bread shop itself) - more profitability or only more costs? LUDEWIG (H-S) and SEIBEL (W) Production of fine baked goods from whole wheat products; SPICHER (G) and ISFORT (G) - Agents of mould formation in fine baked goods (or pastry goods); SEIBEL (W) and SEILER (K) - Addition of extruded wheat flours in the preparation of cakes and plum-cakes; KOHLGRUBER (H-P) and SEIBEL (W) - Quality defects and their avoidance in the production of plum-cakes; BRACK (G) and BRETSCHNEIDER (F) - Lactose in fine yeast doughs: Baking-technological effect in different flours and emulsifiers. Use of ascorbic acid and reduction of fat quantity; SEIBEL (W), BRACK (G) and BRETSCHNEIDER (F) - Baking-technological effect of the sugar substitute Palatinit; SPICHER (G), RABE (E) and INZENHOFER (R) - Biological biochemistry and rye and wheat sour doughs when the foam-souring process is used; NAUMANN (G) - Operational experiences with micro-wave pasteurization; RABE (E), BRUMMER (J-M) and SEIBEL (W) - Re-modeling of the Nutritional Labelling Order - Production of new special breads; BECKER (HG) - Dietary fibre from the consumer's viewpoint; WASSERMANN (L) - What the producer of baked goods must know about the nutritional behaviour of the consumer; and SCHREY (J) - Obstructive respiratory diseases in the baking trade - Baker's asthma. KMD

Snacks

- 3177 NADISON (T). Fabricated snacks. Food Flavour. Ingrid. Process. Packag. 8(6); 1986; 22 3,25

Discusses: starch structure; chemical modification; investigation; cold extrusion; cooker extrusion-half products; fabricated snacks from waste - cold extrusion; and baker snack. BSN

MILK AND DAIRY PRODUCTS

Milk

- 3178 RASHED (MA), MEHANNA (NM) and MEHANNA (AS). Effect of carbon dioxide on improving the keeping quality of raw milk. J. Soc. Dairy Technol. 39(2); 1986; 62-4

Fresh cows' milk samples were treated with CO_2 to give a calculated CO_2 content of 77mM. The treated samples as well as the control were stored at 7 and $20 \pm 5^\circ\text{C}$ for three days and analysed periodically. The increase in the total count as well as the counts of psychrotrophic, lactic acid and coliform bacteria during storage at 7 C was found to be inhibited by the addition of CO_2 . The treated samples had higher titratable acidity and lower pH values than the controls but satisfied the clot-on-boiling test. The keeping quality of cooled milk can therefore be improved by the addition of CO_2 . AA

- 3179 HEPPELL (NJ). Comparison between the measured and predicted sterilization performance of a laboratory-scale, direct heated UHT plant. J. Food Technol. 21(3); 1986; 385-99

The sterilizing efficiency of a small scale direct heating UHT sterilizer has been measured using *Bacillus-stearothermophilus* spores suspended in water and milk. A special technique was used for accurate measurement of the correct concentration of heat resistant spores in the fluid before passage through the sterilizer. The results were compared with the values calculated from the thermal death kinetics of the same spore batch measured in the laboratory, together with the residence time distribution of the liquid in the sterilizer. The two sets of data were found to compare well for a wide range of operating temperatures, confirming that the performance of a continuous sterilizer in practice could be predicted, given accurate information for the spores and the equipment. AA

- 3180 HAGGERTY (P) and POTTER (NN). Growth and death of selected microorganisms in ultrafiltered milk. J. Food Prot. 49(30); 1986; 233-5, 238

Studies were made to compare the growth and death of *Staphylococcus aureus*, *Streptococcus faecalis* and *Escherichia coli* in skim milk concentrated by ultrafiltration to that in unconcentrated skim milk. Skim milk was volume concentrated to 2x in laboratory-scale stirred UF cells. Behaviour of the organisms was analyzed in four inoculated milk samples: 2x retentate, 1 x water-diluted retentate, milk equivalent (retentate plus permeate) and unconcentrated skim milk. Growth of each organism and of total aerobes did not vary in the four milk samples at either 7 or 13°C. For *S. faecalis* and *E. coli*, D-values for samples heated to 62.7 C did not significantly differ in the four milk samples ($p > 0.01$). The D-values of *S. aureus* in water-diluted retentate was slightly but significantly lower than those in the other three milk samples ($p < 0.01$), possibly due to the lowered lactose level in this sample. AA

- 3181 SINDHU (JS) and TAYAL (M). Influence of stabilizers on the salt balance and pH of buffalo milk and its concentrate. *J. Food Technol.* 21(3); 1986; 331-7

The influence of three different concentrations (0.05%, 0.10% and 0.15%) of two stabilizers, disodium phosphate and trisodium citrate on the salt balance (concentration and molar ratios of salt constituents in the dissolved phase) and pH of buffalo milk and its 2:1 concentrate was determined. The disodium phosphate caused a significant shift in all the salt constituents (calcium, magnesium, phosphate and citrate) from the dissolved to the colloidal phase while the trisodium citrate produced a significant shift from the colloidal to the dissolved phase. Further, the phosphate caused a uniform decrease in the molar ratios of Ca/P and (Ca+Mg)/(P+Cit.) in the dissolved phase, while the citrate produced only a small and non-significant effect. Both salts caused a significant increase in pH which was progressive with increase in the concentration of added salts. Therefore, the primary effect of stabilizers in stabilizing or destabilizing the milk is a consequence of their influence on the pH and not on the mineral equilibrium of milk. AA

- 3182 KALRA (RL), CHAWLA (RP), JOIA (BC) and TIWANA (MS). Excretion of DDT residues into milk of the Indian buffalo, *Bubalus bubalis* (L.) after oral and dermal exposure. *Pestic. Sci.* 17(2); 1986; 128-34

Buffaloes were fed with 20, 100 and 400 mg of p, p'-DDT in their daily rations for 30 and 54 days. The DDT residue in the milk fat of the treated animals showed an initial rapid rise but soon attained a dose dependent equilibrium. The transfer coefficient of DDT residues in milk at 'plateau' levels showed an average value of about 12%. Dermal application of p,p'-DDT to buffaloes also resulted in excretion of a significant amount of its residues in milk. KAR

- 3183 TAYLOR (SL). Immunologic and allergic properties of cows' milk proteins in humans. *J. Food Prot.* 49(3); 1986; 239-50

Cows' milk can elicit allergic and other sensitivity reactions in some individuals. Cows' milk allergy (CMA) results from an abnormal immunologic reaction to cows' milk proteins. IgE responses are definitely involved in CMA. Immune complexes and tissue lymphocytes may also play a role in some forms of CMA, but further evidence is needed to firmly establish this possibility. The presence of circulating antibodies to cows' milk proteins of the IgG, IgA and IgM classes is not clinically significant. Such antibodies are found in both normal and allergic individuals. β -lactoglobulin and casein are the most common cows' milk allergens, although other cows' milk proteins may play important roles in some cases. Partial digestion of cows' milk proteins may enhance their allergenicity, whereas complete hydrolysis abolishes their allergenicity. Heating can also alter the allergenicity of the cows' milk proteins, but rather severe heating is required. AA

- 3184 FARAG (RS), HEWEDI (MM), ADD RAYA (SH) and KHALIFA (HH). Detection of cow's milk admixture to buffalo's milk. *Fette Seifen Anstrichm.* 88(3); 1986; 106-8

Gas chromatography was used for the qualitative and quantitative determination of fatty acids of authentic buffalo's milk, cow's milk and buffalo's milk adulterated with cow's milk. The milk fat was separated by fractional crystallization at -20°C into two distinct fractions, i.e., semi-solid and mother liquor. The concentration of fatty acids in the mother liquor changed significantly for 14:0, 16:0 and 18:1 as adulteration levels were increased. The fatty acids of the semi-solid fractions changes in the proportion of 16:0, 18:0 and 18:1, when cow's milk is mixed with buffalo's milk. By applying a regression equation for these acids, adulteration of buffalo's

milk with 5% cow's milk could be distinguished. AA

- 3185 GALESLOOT (TE). Statistical remarks concerning the limiting dilution test used for the bacteriological testing of milk and milk products. *Neth. Milk Dairv. J.* 40(1); 1986; 31-40

Statistical considerations are given to the limiting dilution test wherein a certain test portion of a milk or milk product is tested several times for the presence or absence of the bacteria concerned. Attention is paid to the MPN to be calculated from the results and especially to the calculation of the expected test results starting with a certain concentration in the sample of the bacteria concerned. Further the repeatability of the limiting dilution test is considered and also a method of checking the sensitivity of such a test. AA

- 3186 AL-RAJAB (WJ), AL-DABBAGH (WY) and AL-ZAHAWI (SM). Occurrence of *Salmonella* in Iraqi milk products. *J. Food Prot.* 49(4); 1986; 282-4

Thirty-two (8%) of 400 samples of locally produced milk products were found to contain *Salmonella*. Positive samples included ice cream (10.9%), Kishfa (10%), Gaymer (7.5%), cheese (6.6%) and yogurt (1.6%). A total of 15 serotypes were identified from these samples, where *Salmonella typhimurium* and *Salmonella infantis* occurred with the highest frequency. AA

Cheese

- 3187 HICKS (CL), ONUORAH (C), O'LEARY (J) and LANGLOIS (BC). Effect of milk quality and low temperature storage on cheese yield. A summation. *J. Dairy Sci.* 69(3); 1986; 649-57

- 3188 CANTONI (C), CATTANEO (P) and BALZARETTI (C). Production of Staphylococcal enterotoxins by staphylococci isolated from cheese. *Ind. Aliment.* 23(4); 1986; 291-5 (Italian)

The biosynthesis of enterotoxins by *Staph. aureus* strains isolated from toxic cheese was investigated. ELISA method has been used and enterotoxins A and D have been detected. AA

- 3189 WARBURTON (DW), PETERKIN (PI) and WEISS (KF). A survey of the microbiological quality of processed cheese products. *J. Food Prot.* 49(3); 1986; 229-30

A study done in 1980 to 1981 assessed the overall bacteriological quality of three varieties of domestic and imported processed cheese products. All of the 78 lots tested had counts of <1.8 *Escherichia coli* and coliforms/g, and had no staphylococcal thermonuclease activity. Domestic products had significantly higher levels of aerobic sporeformers than imported products ($P = 0.05$), whereas the differences in levels of anaerobic sporeformers in these products were not significant. Results of this study indicated that good manufacturing practices were used during the processing of these products. AA

- 3190 PRASAD (R), MALIK (RK) and MATHUR (DK). Purification and characterization of extracellular caseinolytic enzyme of *Micrococcus* Sp. MCC-315 isolated from cheddar cheese. *J. Dairy Sci.* 69(3); 1986; 633-42

- 3191 OMAR (MM) and EL-ZAYAT (AI). Acceleration of the ripening of Gouda cheese made from reconstituted milk. *Dtsch. Lebensmittel-Rundschau.* 82(5); 1986; 152-5

Gouda cheese was made from lactose hydrolysed reconstituted milk treated with lipase. The chemical composition, the microstructure and the organoleptic properties of cheese were examined when young and after 1 and 2 month of storage. The addition of enzyme increased the

fusion of casein micelles; the degradation of protein; the hydrolysis of fat; the accumulation of free amino and fatty acids without rancidity and improved the quality of cheese. AA

- 3192 FERNANDEZ (A) and KOSIKOWSKI (FV). Physical properties of direct acidified Mozzarella cheese from ultrafiltered whole milk retentates. *J. Dairy Sci.* 69(3); 1986, 643-8

- 3193 MOORE (PL), RICHTER (RL) and DILL (CW). Composition, yield, texture, and sensory characteristics of Mexican white cheese. *J. Dairy Sci.* 69(3); 1986; 855-62

Whey

- 3194 SCHMIDT (RH), SMITH (DE), PACKARD (VS) and MORRIS (HA). Compositional and selected functional properties of whey protein concentrates and lactose-hydrolyzed whey protein concentrates. *J. Food Prot.* 49(3); 1986; 192-5

Commercial whey protein concentrate (WPC) products, manufactured by ultrafiltration with and without lactose hydrolysis, were compared for proximate composition, mineral and trace mineral composition and for protein solubility and viscosity parameters. Protein concentration ranged from 30.5 to 52.7%, while ash content ranged from 5.9 to 12.0%. Extent of lactose hydrolysis in lactose-hydrolyzed WPCs was estimated at 60 to 75% of the initial lactose level. Protein solubility of 10% protein dispersions of the WPC samples ranged from 90 to 100% and was not affected by heating WPC dispersions at 65°C for 30 minutes or by increased centrifugation force in solubility determination from 40,000 x g to 100,000 x g. All WPC dispersions exhibited pseudoplastic flow behaviour as indicated by flow behaviour indices (n) of less than 1.0. WPC dispersions possessed a low viscosity as indicated by consistency index (k) data, and k values decreased slightly after heating. Lactose hydrolysis had no apparent effect on solubility or viscosity properties of the WPC dispersions. Alteration of electrophoretic mobility of polyacrylamide gel electrophoresis was observed for Δ -lactalbumin in lactose-hydrolyzed WPC samples. AA

- 3195 SLACK (AW), AMUNDSON (CH) and HILL (CG) Jr. Foaming and emulsifying characteristics of fractionated whey protein. *J. Food Process. Preserv.* 10(2); 1986; 81-8

The foaming and emulsifying characteristics of whey protein concentrates and β -lactoglobulin and Δ -lactalbumin enriched fractions derived therefrom were measured. The spray dried WPCs and the Δ -lactalbumin enriched fraction derived from acid whey protein concentrate produced foams comparable to those produced from egg whites. The freeze dried WPCs and β -lactoglobulin enriched fractions exhibited little foaming ability. The WPC and β -lactoglobulin enriched fractions produced acceptable emulsions although they do not appear to have as good emulsifying properties as egg yolks do. The Δ -lactalbumin enriched fractions had poor emulsifying properties. These results indicate that fractions of WPC into β -lactoglobulin and Δ -lactalbumin enriched fractions results in products with improved foaming and emulsifying properties. AA

- 3196 SHAY (LK) and WEGNER (GH). Nonpolluting conversion of whey permeate to food yeast protein. *J. Dairy Sci.* 69(3); 1986; 676-83

- 3197 MODLER (HW) and LEFKOVITCH (LP). Influence of pH, casein, and whey protein denaturation on the composition, crystal size, and yield of lactose from condensed whey. *J. Dairy Sci.* 69(3); 1986; 684-97

- 3198 GREGORY (AG). Molar ratio of sodium and chloride in sweet-type whey and inability to determine sodium concentrations from chloride measurements. *J. Food Prot.* 49(4); 1986; 285-9

Sodium levels in sweet-type whey must be determined by direct measurement of sodium. The chloride assays, commonly used in the dairy industry, use silver to measure chloride and the results are interpreted as a measure of sodium chloride. This interpretation is in error due to the molar excess of chloride relative to sodium in whey. This was demonstrated by testing samples of sweet-type dry whey for sodium and chloride. Also, a material balance for sodium and chloride was performed throughout the cheesemaking process, demonstrating that this excess of chloride is introduced into the process with the whole milk. These natural milk salts remain predominantly in the whey, maintaining the molar excess of chloride relative to sodium. AA

Yoghurt

- 3199 MCGREGOR (JU) and WHITE (CH). Effect of sweeteners on the quality and acceptability of yoghurt. *J. Dairy Sci.* 69(3); 1986; 698-703

MEAT AND POULTRY

Meat

- 3200 MORLEY (MJ). Derivation of physical properties of muscle tissue from adiabatic pressure-induced temperature measurements. *J. Food Technol.* 21(3); 1986; 269-77

A novel approach to investigating the physical properties of meat is described, involving measurement of the temperature change induced by adiabatic compression. After satisfactory tests on water, the method was used to obtain data for the thermal expansivity, density and ratio of specific heats of muscle tissue between about -24 and +16 C. AA

- 3201 UNRUH (JA). Effects of endogenous and exogenous growth-promoting compounds on carcass composition, meat quality and meat nutritional value. *J. Anim. Sci.* 62(5); 1986; 1441-8

- 3202 SCHMIDT (GR), MEANS (WJ) and CLARKE (AD). Using restructuring technology to increase red meat value. *J. Anim. Sci.* 62(5); 1986; 1458-62

- 3203 HOLTZ (E) and SKJOLDEBRAND (C). Simulation of the temperature of a meat loaf during the cooking process. *J. Food Eng.* 5(2); 1986; 109-21

A mathematical model of heat and mass transfer in the cooking of a meat loaf has been derived to stimulate the changing temperature profile in the product. Heat transfer coefficients have been calculated from the amount of energy supplied under different air conditions. Weight losses were monitored and, from these, mass transfer rate curves were drawn. KAR

- 3204 MACFARLANE (JJ), MCKENZIE (IJ) and TURNER (RH). Pressure-heat treatment of meat: Changes in myofibrillar proteins and ultrastructure. *Meat Sci.* 17(3); 1986; 161-76

The effects on muscle of a combined pressure-heat (P-H) treatment that overcomes myofibrillar toughness have been investigated using SDS gel electrophoresis and electron microscopy. Densitometer scans of polyacrylamide gels of muscle extracts revealed that P-H treatment caused greater degradation of connectin than did heat treatment alone. Breakdown of connectin by P-H treatment was reduced in

muscle that had been injected with the protease inhibitor pepstatin. However, pepstatin treatment did not reduce the effectiveness of P-H treatment for tenderizing meat, as would be expected if connectin was responsible for myofibrillar toughness. P-H treatment resulted in an increase in the intensity of a peak with M_r 150 000, but this peak was also produced by non-tenderizing pressure treatments. The ultrastructural studies revealed that P-H treatment disrupted the thick and the thin filaments, leaving voids at the M-line region. It is suggested that P-H treatment achieves most of its effect by an irreversible disaggregation of the myosin of thick filaments. AA

- 3205 FJELKNER-MODIG (S) and TORNBERG (E). Water distribution in porcine M. longissimus dorsi in relation to sensory properties. *Meat Sci.* 17(3); 1986; 213-31

- 3206 COMI (G), D'AUBERT (S) and CANTONI (C). Streptococci D in foods of animal origin. *Ind. Aliment.* 25(4); 1986; 289-90 (Italian)

The Streptococcus D strains found in meats, cured meat products, cheeses, salted fish, and fish were investigated. Not a single strain was found to be enterotoxigenic. KMD

- 3207 OGARA (MCLde), BERCOVICH (F), PILOSOF (AMR) and BARTHOLOMAI (G). Denaturation of soybean proteins related to functionality and performance in a meat system. *J. Food Technol.* 21(3); 1986; 279-87

The effect of heat treatment on the functional properties of a soybean protein isolate was studied; heat affected the nitrogen solubility and gel properties of the isolate as well as its water absorption ability and viscosity. Significant correlations were found between protein solubility and gel viscosity. The viscosity of dispersions correlated to solubility or to water absorption depending on the protein concentration. Significant correlations were found between the functional properties of the protein and moisture loss from a model system in which the meat protein was partially replaced with soya. Protein solubility and gel properties were found to be the best predictors of moisture loss from the meat system. Viscosity of raw meat systems correlated with the solubility and water absorption of the added soya protein. AA

- 3208 JANSSEN (FW), VOORTMAN (G) and BAAIJ (Jade). Detection of soya proteins in heated meat products by "blotting" and "dot blot". *Z. Lebensmittel-Unters Forschung.* 182(6); 1986; 479-83

Soy proteins (isolates, concentrates and texturates) as well as meat products containing soya isolate were analysed by SDS-electrophoresis. The separated proteins were blotted on nitrocellulose and stained with a selective immunoperoxidase system with the following sequence: primary (anti-soya) serum, goat anti-rabbit IgG serum and peroxidase-antiperoxidase complex (rabbit allotype). By developing the blot with a peroxidase substrate, the antigenic soya fractions were visualised while the meat proteins did not stain. All major (reduced) soya fractions α , α' , β conglycinin, the acid and basic subunits of glycinin as well as some minor fractions became visible with a commercially available anti-soya serum as primary antiserum. The pattern thus obtained provides a high evidence for the presence of soya protein in meat products. Detection level is about 0.02% of soya protein. During a 24-hour incubation at room temperature (before heat processing) of a meat product containing soya product and raw liver, a remarkable loss of antigenic material was observed. AA

- 3209 ANUCHA (TCA), OKIEIMEN (FE) and AJIBOLA (MM). Contamination of meat products by trace quantities of nitrosodiethanolamine (NDELA). *Bull. Environ. Contam. Toxicol.* 36(3); 1986; 392-5

Five samples of Soya (popular indigenous ready-to-eat meat prod

uct normally prepared by coating boneless meat (usually beef) with spices) obtained from retail outlets in Benin City, Nigeria, were assessed for their N-nitrosodimethanolamine (NDELA) content and its effect on the storage behaviour of Suya. Freshly grilled Suya showed NDELA content varying from 0.87-1.29 mg/kg, representing between 31% and 43% reduction in the level of contamination of the grilled product. NDELA content of Suya gradually increased from 18 hours to a maximum of 2.02 mg/kg. By heating cold meat products for 3-5 minutes, NDELA content showed a significant increase. BSN

- 3210 KASTNER (CL) and KROPP (DH). Processed meat products and safety issues. *Dairy Food Sanit.* 6(5); 1986; 186-93

Discusses: why process meat; processed meats; ingredients used in processed meat; processing methods; parasites and molds; and meat, fat and health. BSN

- 3211 MALISCH (R). Multi-method for the determination of residues of chemotherapeutics, anti-parasitics, and growth promoters in foodstuffs of animal origin. Part 8. General procedure and determination of sulfonylamides. *Z. Lebensmittel-Unters. Forsch.* 182(5); 1986; 385-99 (German)

Using the multi-method described in this paper, it was possible to isolate from eggs, milk, and meat, more than 60 chemotherapeutics, anti-parasitics, and growth promoters by means of a single procedure. Residues were detected by different chromatographic systems (HPLC with UV-detection, capillary GC with an ECD). The detection limits ranged from 0.2 to 0.0002 mg/kg. KMD

- 3212 RUTEGARD (A) and KILBERG (C). Control of residues of antibiotics and chemotherapeutic agents in meat. *Var Foda.* 38(3-4); 1986; 249-55 (Swedish)

Since 1978, the meat inspection service at Swedish slaughter establishments has used a sensitive, microbiological method in order to analyse carcasses for residues of antibiotics and chemotherapeutic agents. Of 27 000 carcasses (randomly chosen from 5 million slaughtered animals) analysed during 1984, only 13 (0.5 per thousand) were shown to contain such residues. False positive reactions occur occasionally in the preliminary tests at the slaughter establishments. Thus it is essential to have access to a simple and practical method for confirmation of the positive residues in order to minimize unnecessary condemnation of meat. Several methods for identification of antibiotics and chemotherapeutic residues have been tested. The best result was achieved with a chemical inactivation method. This method has been used since 1978 in Sweden where a reference laboratory under the supervision of the Swedish National Food Administration performs confirmatory tests of positive results reported from the slaughter establishments. AA

- 3213 OSTERDAHL (B-G) and JOHNSON (H). Analysis of diethylstilbestrol in meat. *Var Foda.* 38(3-4); 1986; 276-9 (Swedish)

About 400 samples of Swedish meat for export and 35 samples of imported meat were examined at the Swedish National Food Administration in 1981-1984 for residues of diethylstilbestrol. All samples were negative. Trace amounts of diethylstilbestrol, 0.5-1.0 µg/kg, were found from few samples of 1981 sanitary slaughter meat. AA

- 3214 FAGERLUND (B). Drug residues in meat, milk and eggs. *Var Foda.* 38(3-4); 1986; 211-23 (Swedish)

The demand for profitability in modern livestock production has led to increasing centralization during the last few decades. High density animal populations and frequent trading of animals are common. Because of this, diseases are more easily spread among the animals and consequently, more animals are treated with drugs for prophylactic

or therapeutic purposes. For this reason, the consumption of drugs and feed activities in modern animal husbandry has steadily increased. AA

- 3215 KUIVINEN (J) and SLANINA (P). Effect of cooking on ivermectin residues in meat. *Varfoda*. 38(3-4); 1986; 280-84 (Swedish)

The effect of heat treatment on veterinary drug residues was studied by analysing the levels of Ivermectin (an antiparasitic drug) after cooking the meat from cattle treated with this drug. The results showed a decrease in ivermectin concentrations after conventional frying (60 - 77°C) and boiling (78°C) of minced beef. The results are compared with those from other studies concerning the residues of antibiotics and sulphonamides, as well as other antiparasitic drugs. The residues of several veterinary drugs seem to be diminished after normal cooking. The degree of inactivation is dependent on the temperature and the length of cooking and also varies with the drug studied. AA

Beef

- 3216 RILEY (RR), SMITH (GC), CROSS (HR), GAVELL (JW), LONG (CR) and CART WRIGHT (TC). Chronological age and breed-type effects on carcass characteristics and palatability of bull beef. *Meat Sci*. 17(3); 1986; 187-98

- 3217 BRASINGTON (CF), STIFFLER (DM) and STERMER (RA). Prerigor versus chilled boning of beef carcass sides on the rail: Measurement of time, effort, yield and space requirements. *J. Food Prot*. 49(3); 1986; 211-5

Twenty-four mixed-breed heifers were slaughtered in groups of four. Their slaughter ages were from 18 to 20 months and the hot carcass weights ranged from 218 to 277 kg. A time study of on-the-rail boning of prerigor "hot" and chilled sides showed that chilled sides required 30% more time to process. Boning of chilled sides was more difficult and demanded about 49% more effort than the boning of hot sides. The yield of boneless meat was 0.51% greater when removed hot than the boneless meat removed after 24 hour in a 0°C cooler. The shrink and cutting loss for chilled-boned sides was 2.46% with 2.19% shrink during overnight storage in the chill cooler and 0.27% cutting loss. It is suggested that hot-boned meat be transferred to further processing immediately or rapidly chilled to below 8°C to maintain the microbiological integrity. The space requirements for storing carcasses and boxed meat is 81% less when the conventional cold-boning process is replaced by the accelerated hot-boning process. AA

- 3218 BELL (MF), MARSHALL (RT) and ANDERSON (ME). Microbiological and sensory tests of beef treated with acetic and formic acids. *J. Food Prot*. 49(3); 1986; 207-10

One-centimeter cubes of the semimembranosus and adductor muscles of beef were inoculated with 5.2×10^6 of *Salmonella typhimurium*, *Shigella sonnei*, *Yersinia enterocolitica*, *Escherichia coli*, *Pseudomonas aeruginosa* or *Streptococcus faecalis*. Exposure of the meat by dipping in 1.2% acetic acid for 10 seconds reduced average numbers recoverable of these bacteria by 65% *E. coli* was the most resistant, losing 46% of its viable cells. One-half of the acetic acid was replaced with 0.046% formic acid without loss in effectiveness. The rate of increase in antimicrobial effects of the treatment declined with time. Discoloration of the meat occurred after dipping in both 1.2% acetic acid, and 0.6% acetic plus 0.046% formic acids for 10 seconds in triangle tests of flavour, panelists failed to differentiate samples of baked ground beef treated (before grinding) with 0.6% acetic acid and 0.046% formic acid from controls dipped in water ($P < 0.05$). However, the same type of test showed a significant flavour difference between meat dipped in 1.2% acetic acid or distilled water. AA

- 3219 WRIGHT-RUDOLPH (L), WALKER (HW) and PARRISH (FC), Jr. Survival of *Clostridium perfringens* and aerobic bacteria in ground beef patties during microwave and conventional cookery. *J. Food Prot.* 49(3); 1986; 203-6

Conventional oven cookery was more effective than microwave oven cookery for reducing numbers of aerobic microorganisms and *Clostridium perfringens* in ground beef patties when the meat was heated to approximately the same internal temperatures of 65-71 C for rare or 77-93 C for well done. Reductions in numbers of *C. perfringens* during microwave cookery of patties inoculated with 10^5 vegetative cells/g ranged from 0.75 to 1.48 /g (log values); for conventional cookery, these reduction values ranged from 3.51 to 8.06/g (log values). Recovery of heat-stressed cells of *C. perfringens* was equally efficient in Trypton-Sulphite-Cycloserine agar and Sulphite-Polymyxin-Sulfadiazine agar. AA

- 3220 DAISE (RL), ZOTTOLA (EA) and EPLEY (RJ). Potato-like odour of retail beef cuts associated with species of *Pseudomonas*. *J. Food Prot.* 49(4); 1986; 272-3

Retail cuts of beef and hamburger packages from a North Dakota meat processor were examined due to consumer complaints of a strong potato-like or musty odour associated with the meat. Examination for total numbers of aerobic bacteria on plate count agar and for gram-negative psychrotrophic bacteria on crystal violet tetrazolium agar revealed numbers in excess of 10^6 CFU/g. Numbers of coliform bacteria on violet red bile agar were in excess of 10^5 CFU/g. Gram-negative rods were isolated and identified. The isolates were characterized by a positive catalase reaction, oxidase production, an oxidative O/F reaction, nonutilization of lactose, liquefaction of nutrient gelatin, slight motility, production of acid in litmus milk with decolouration and clotting, nonproduction of indole, and nonreduction of nitrate. The isolate was tentatively identified as a *Pseudomonas* of undetermined species, probably a variant of either *Pseudomonas taetrolens* or *Pseudomonas perolens*. AA

- 3221 ROBERTS (T). A retrospective assessment of human health protection benefits from removal of tuberculous beef. *J. Food Prot.* 49(4); 1986; 293-8

In the early 1900s, government agencies instituted two programs, Federal slaughterhouse inspection and on-farm tuberculin testing, to control the spread of bovine tuberculosis (TB). From this historical perspective, the economic benefits of these programs are estimated using four parameters: (a) an estimation of how many cattle would have had bovine TB without the programs, (b) the likelihood of those infected cattle causing human illness through aerosol contamination, penetration of the skin via cuts and nicks, cross-contamination of other foods in the home, and consumption of meat and meat products, (c) current costs of treating human cases of TB, and (d) the evaluation of the benefits of preventing the death of some individuals. Based on these four parameters, the TB control programs have possible estimated economic benefits which range from \$30 to \$300 million annually. AA

Cattle

- 3222 GAIANI (R) and CHIESA (F). Physiological levels of androstenedione and testosterone in some edible tissues from calves, bulls and heifers. *Meat Sci.* 17(3); 1986; 177-85

Pork

- 3223 TYSZKIEWICZ (I) and BALDWIN (Z). Sensoric and chemical limits in lowering the dose of sodium nitrite in the process of pork curing. *Nahrung*. 30(2); 1986; 141-5

The specific cured meat odour and taste stimulus thresholds in pork containing different quantities of sodium nitrite were determined in relation to the residual nitrite level and relative contents of nitrosylpigments in meat. It was found that the specific odour and taste detection thresholds were equal to 10 and below 10 mg NaNO_2 /kg of meat, respectively, and the specific odour and taste recognition thresholds were equal to 26 and 21 mg NaNO_2 /kg of meat, respectively. The detection and recognition thresholds corresponded to 2.4 and 8.5 mg of residual nitrite in meat, respectively. In all the cases the relative contents of nitrosylpigments were above 50%. Taking into account the maintaining of specific cured meat odour and taste, the dose of sodium nitrite in pork curing may be lowered to 30 mg/kg. AA

- 3224 BROOKS (RI), PEARSON (AM), HOGBERG (MG), PESTKA (JJ) and GRAY (JI). An immunological approach for prevention of boar odour in pork. *J. Anim. Sci.* 62(5); 1986; 1279-89

- 3225 MILES (RS), MCKEITH (FK), BECHTEL (PJ) and NOVAKOVSKI (J). Effect of processing, packaging and various antioxidants on lipid oxidation of restructured pork. *J. Food Prot.* 49(3); 1986; 222-5

Effects of processing (prerigor vs. postrigor), packaging (vacuum vs. PVC overwrap) and various antioxidants [sodium tripolyphosphate (STP); butylated hydroxyanisole (BHA); butylated hydroxytoluene (BHT) plus citric acid (BBC); α -tocopherol (Toc); and ascorbyl palmitate plus α -tocopherol (APT) on the oxidation of restructured pork chops after storage at 4 C were evaluated. Three barrows were slaughtered on separate days and were used as replicates in the experiment. One side of each carcass was boned within 1 hour postmortem (pre-rigor) and the remaining side was boned after 24 hour at 4 C (post-rigor). Restructured chops were formulated to contain 25% fat and six 4.5-kg batches were randomly allotted to the six antioxidant treatments: (a) 0% NaCl (NSC); (b) 0.5% NaCl (SC); (c) 0.5% NaCl + 0.5% STP; (d) 0.5% NaCl + BBC; (e) 0.5% NaCl + Toc; and (f) 0.5% NaCl + APT. Batches were stuffed in a fibrous casing, frozen for 2 hour and sliced (19 mm). The sliced chops were randomly allotted to vacuum and PVC overwrap packaging treatments and evaluated for discolouration and TBA value on days 0, 4, 8, 12 and 16. Vacuum packaging reduced discolouration scores and lowered TBA values ($P < 0.01$) on days 8, 12 and 16. TBA values for all antioxidant treatments different from the SC treatment on days 12 and 16 ($P < 0.05$). These data indicate that antioxidants and/or vacuum packaging are effective methods of controlling discolouration and oxidation of restructured pork during storage; however, processing time postmortem did not affect ($P > 0.05$) the rate of lipid oxidation. AA

- 3226 HOUBEN (JH) and KROL (B). Effect of ascorbate and ascorbyl palmitate on lipid oxidation in semi-dry sausages manufactured from pork materials differing in stability towards oxidation. *Meat Sci.* 17(3); 1986; 199-211

Pigs

- 3227 KOLCZAK (T) and KRAELING (RR). Susceptibility to stress, postmortem muscle metabolism and meat quality of pigs after modification of the fluid volume of the vascular and extravascular spaces. *J. Anim. Sci.* 62(3); 1986; 646-59

Bacon

- 3228 HUHTANEN (CN) and TALLEY (FB). Acceptability of bacons stored si weeks at 4 or -23 C. *J. Food Prot.* 49(3); 1986; 180-82

Bacon was obtained from production lines of two local processing plants, H and M. The slices from 8 bellies from each plant were sequentially rearranged to form composite portions representative of each belly; these were analyzed for moisture-phase NaCl and for acceptability by a panel of judges using a 9-point hedonic scale. Samples were tasted shortly after processing and again after 6 weeks of storage at 4 or -23 C. The moisture-phase NaCl content ranged from 4.62 to 7.80% (c.v. = 18.2%) for bacon from plant H; the range for bacon from plant M was 3.25 to 10.05% (c.v. = 37.7%). The belly from plant M with the highest moisture-phase NaCl content also gave the lowest hedonic score of the bacon samples tasted before storage. The average hedonic scores for bacon from the two plants were different ($p < 0.05$). There were no significant differences due to storage condition for bacon from plant M, but bacon stored at 4 C from plant H had lower ($p < 0.05$) average scores than the bacon sampled shortly after processing or that kept 6 weeks at -23 C. Storage at 4 C caused a significant ($p < 0.01$) reduction in hedonic score in one belly from each plant. AA

Poultry

- 3229 STECHINI (M) and CASERIO (G). Compared study of three medium for the isolation of salmonellas from mechanically deboned poultry and turkey meat. *Ind. Aliment.* 25(4); 1986; 284-8 (Italian)

The relative efficiencies of Rappaport-Vassiliadis medium with soy peptone (soya-RV), Selenite cv. stine broth (SC) and Tetrathionate brilliant green broth (TBG) for the isolation of salmonellas from mechanically deboned poultry and turkey meat, were compared. From 60 samples, 48 were found positive with soya-RV medium, 27 with SC-broth, whereas only 15 with TBG broth. The superiority of soya-RV medium concerned the number of positive samples and also the suppression of "false positive" colonies on the selective solid media. AA

- 3230 FOILLOSI (RF). High performance thin layer chromatographic screening for aflatoxins in poultry feed by using silica sep-paks. *Bull. Environ. Contam. Toxicol.* 36(6); 1986; 815-8

Chickens

- 3231 JUVEN (BJ) and RUGOL (M). Incidence of *Campylobacter jejuni* and *Campylobacter coli* serogroups in a chicken processing factory. *J. Food Prot.* 49(14); 1986; 290-92

Chicken carcasses and water samples were tested for contamination with *Campylobacter jejuni* or *Campylobacter coli* at a water-immersion stage in a kosher poultry processing factory. Among the wide variety of serogroups found on carcasses and water samples, only serogroups #2, #11 and #12 ranked among those most frequently isolated in Israel from humans. AA

Eggs

- 3232 GAUCH (R), LEUENBERGER (U) and MULLER (U). Determination of amprolium in hen's eggs by means of HPLC. *Dtsch. Lebensmittel-Rundschau.* 82(6); 1986; 182-4 (German)

The determination of amprolium in eggs with HPLC is described. This coccidiostatist extracted from the homogenate of egg with acidified 2-propanol, isolated as ion pair and determined by HPLC (limit of detection: approx. 10 µg Amprolium/kg egg). Positive results may be confirmed: Amprolium is converted to 2-picoline by a cleavage with sulphite and determined by HPLC. AA

SEAFOODS

Fish

- 3233 SATO (K), YOSHINAKA (R), SATO (M) and IKEDA (S). A simplified method for determining collagen in fish muscle. *Bull. Jpn. Soc. Sci. Fish.* 52(5); 1986; 889-93

It was found that collagen in the muscle could be quantitatively recovered only in the acid-soluble and hot water-soluble fractions and non-collagenous proteins were absent in these fractions. On this basis, colorimetric determination of protein in these fractions, a simplified method was devised for determining soluble and insoluble collagens in the muscle. KAR

- 3234 ASKAR (A), EL-SAIBY (S), ALI (A), SHEHATA (MI) and BASSIOUNY (SS). Biogenic amines in fish products. *Dtsch. Lebensmittel-Rundschau.* 82(6); 1986; 188-91 (German)

The contents of histamine, tyramine, trimethylamine, and total volatile nitrogen were determined in salted and smoked herring (*Clupea harengus*) and salted mullet (*Mugil cephalus*) during processing and storage. The histamine content was also investigated in 29 market samples of frozen and canned fish, and in some samples of salted and smoked fish. Frozen fish had a low content of histamine. Most of the samples of processed fish had a histamine content greater than 10 mg/100 g, especially salted mullet, sardine, and ray fish, and local canned mackerels. Some of the samples were already decomposed (histamine content > 20 mg/100 g; and/or trimethylamine content > 50 mg/100 g). No samples reached the hazard level of 50 mg histamine/100 g. The tyramine content was relatively low. No close relationship could be established between the increases in histamine content and trimethylamine content. KMD

- 3235 CLINGMAN (CD) and HOOPER (AJ). The bacterial quality of vacuum packaged fresh fish. *Dairy Food Sanit.* 6(5); 1986, 194-7

Vacuum packaging prolongs the shelf life of fresh fish by suppressing the growth of psychrotropic aerobic organisms associated with spoilage. Based on the investigations, it has been found that fresh fish vacuum packaged at 4 C may be stored and distributed upto 14 days without any adverse affect on physico-chemical and organoleptic characteristics. BSN

- 3236 ISLAM (NMD), MOTOHIRO (T) and ITAKURA (T). Combined effect of heat treatment and protamine on the growth and heat resistance of *Bacillus* spores. *Bull. Jpn. Soc. Sci. Fish.* 52(2); 1986; 919-22

Increasing the heating time at 95 C decreased the protamine required in the prevention of growth from the spores and vice versa. With high concentration of organic substances in the media, higher level of protamine and longer heating time was necessary for the prevention of growth. D value for the thermal death of *B. subtilis* heated at 90 C were 17 and 14.5 minutes per control and with 200 ug protamine/ml respectively. KAR

- 3237 LUNDBORG (LE). Food hygienic aspects of fish and shellfish farming. *Var Foda.* 38(3-4); 1986; 239-48 (Swedish)

The article briefly discusses some of the problems associated with farming of fish and shellfish for human consumption. Factors such as water pollution, feed additives, fish diseases, pharmaceutical their possible influence on the fitness of the final

product for human consumption are discussed. The species farmed are mainly rainbow trout (*Salmo gairdneri*) and less frequently Atlantic salmon (*S. salar*), brook trout (*S. trutta*) and to a lesser extent eel (*Anguilla anguilla*) and carp (*Cyprinus* spp). AA

Cod

- 3238 BENNETT (R) and HAMILTON (M). Consumer acceptability of cod and whiting after chilled storage and freezing and thawing. *J. Food Technol.* 21(3); 1986; 311-7

The effect of freezing and thawing, and of storage at 0 C on the acceptability of two white fish species (cod and whiting) was investigated. It was concluded that samples which had been frozen and thawed were no less acceptable than fresh samples and that storage of fresh fish at 0 C produced a linear decline in overall acceptability of both species. A method of presenting the data to allow decisions to be taken on the shelf life of chilled products is discussed. AA

Hake

- 3239 SEIDLER (T), LACHOWICZ (K) and KRUPSKA (B). Studies on thermal treatment on hake. Part 1. Effects of thermal treatment and frozen storage on the content of SH groups and rheologic properties of hake flesh. *Nahrung.* 30(2); 1986; 191-8

Herrings

- 3240 KLAUSEN (NK) and LUND (E). Formation of biogenic amines in herring and mackerel. *Z. Lebensmittel-Unters Forschung.* 182(6); 1986; 459-63

The formation of biogenic amines (histamine, cadaverine, putrescine and spermidine) was followed during vacuum packed storage at 2°C or 10 C in the scombroid fish mackerel and in the non-scombroid fish herring. Also the changes in the content of free amino acids and in the organoleptic and microbiological qualities were followed. At 10 C, the amine contents were 2-20 times higher at the time of rejection as compared with samples stored at 2°C. In herring and mackerel similar amounts of histamine were accumulated, whilst cadaverine was formed at much higher levels in mackerel compared with herring. The high contents of cadaverine in mackerel can possibly explain why mackerel and not herring are often implicated in incidents of scombortoxic poisoning. AA

Krill

- 3241 KOLAKOWSKA (A). Lipid composition of fresh and frozen-stored krill. *Z. Lebensmittel-Unters Forschung.* 182(6); 1986; 475-8

Lipid classes in seven krill (*Euphausia superba* D.) samples, fresh and after various periods of storage at 251 K were compared. Fresh krill lipid composition differed from that determined in frozen samples, depending on storage duration, season of harvest, and developmental stage (as determined on a few samples only). Phospholipids proved most susceptible to changes, as opposed to triglycerides, which were most resistant; diglycerides and cholesterol esters were also destroyed. The freezing process *per se* affected the lipid composition only slightly; however, after 30 days storage the amount of free fatty acids almost doubled. After 6 months storage at 251 K, 70% phospholipids were decomposed and the amount of free fatty acids increased by a factor of 6 to 20. Monoglycerides, absent from fresh krill, appeared after several months of frozen storage. Juvenile krill were more susceptible to lipolytic changes. Females bearing mature eggs contained stable phospholipids; it was only triglycerides that were hydrolysed. It seems probable that discrepancies encountered in the literature

data on krill lipid composition are the result of frozen krill being analysed. AA

Mackerels

- 3242 AMINULLAH DHUIYAN (AKM), ACKMAN (RG) and LALL (SP). Effects of smoking on protein quality of Atlantic mackerel. *J. Food Process. Preserv.* 10(2); 1986; 115-26

Atlantic Mackerel (*Scomber scombrus*) fillets were hot-smoked using an AFOS-Torrey Mini Kiln. The nutritional quality of both smoked and non-smoked fish protein prepared from the same lot of fish, and of a standard protein casein, were evaluated by protein efficiency ratio (PER) in male rats. The hot smoking process caused a significant ($p \leq 0.05$) decrease in PER of protein from smoked mackerel muscle as compared with that from non-smoked fish muscle. The change in protein quality was related to the loss of essential amino acids such as lysine and tryptophan and a reduced availability of lysine from smoked fish. Determination of lysine and tryptophan in three layers of the fillet (innermost, middle and outermost) showed that the maximum loss of these amino acids from smoking was in the outer most layer. Lysine and tryptophan were determined by high performance liquid chromatography and spectrophotometric methods, respectively. A small percentage of rats showed some evidence of pale liver on diets containing either casein or smoked mackerel. AA

Tilapia

- 3243 CURRAN (CA), POULTEN (RG), BRUETON (A) and JONES (NSD). Cold shock reactions in iced tropical fish. *J. Food Technol.* 21(3); 1986; 289-99

The development of a rigor mortis-like stiffening and the biochemical changes associated with it were investigated in tilapia (*Oreochromis aureus/niloticus* hybrid), a tropical freshwater species, and common carp (*Cyprinus carpio*), a temperate freshwater fish, during storage in ice (0°C) and at ambient temperature (22°C). Onset of stiffening in carp occurred between 16 and 17 hours after death at both temperatures but full stiffness developed much later and was a longer duration at 0°C. In tilapia, onset occurred after 7 hours at 22°C and full stiffness was established after 19 hours. However, at 0°C, tilapia experienced a cold shock reaction such that they stiffened within minutes of being placed in ice and were fully rigid within 8 hours. Resolution of stiffness in this species also occurred later at 0°C. The rate of ATP degradation was similar under both storage conditions in tilapia but more rapid at ambient temperature in carp. Although the rate of lactic acid accumulation was faster at the higher temperature in tilapia, it was not nearly so marked as for carp. Objective measurement of contractions in excised muscle fibres from trout (*Salmo gairdnerii*) and tilapia indicated that reducing the temperature delayed the occurrence of the contraction and reduced its intensity. It was concluded that cold shock stiffening and rigor mortis stiffening are different. AA

- 3244 CURRAN (CA), POULTER (RG), BRUETON (A), JONES (NR) and JONES (NSD). Effect of handling treatment on fillet yields and quality of tropical fish. *J. Food Technol.* 21(3); 1986; 301-10

The effect of fillet yields and quality of the cold shock reaction of tropical fish when they are iced immediately following death was investigated. Tilapia (*Oreochromis mossambicus/niloticus* hybrid) were subjected to three handling treatments: filleting immediately following death; icing the whole fish immediately following death and filleting after 3 days; ageing the fish for 6 hours at ambient temperature prior to icing and then filleting after 3 days. All fillets were stored on ice until 9 days after death. Pre-rigor filleting

resulted in the highest filleting yields with the least drip loss and gaping on storage but the shortest shelf life. This was accompanied by the highest post-mortem metabolic rate. The lowest yields and highest drip loss were obtained by icing the fish immediately at death followed by filleting after 3 days. A 6-hour delay before icing gave yields and drip loss which were between these two extremes and also the slowest post-mortem metabolism. The two post-rigor filleting procedures produced fillets with increasing gaping but a longer shelf life compared with pre-rigor filleting. The implications of the cold shock reaction in terms of recommended codes of practice and handling operations in tropical fisheries are discussed. AA

Tuna

- 3245 GALINDO (L), HARDISSON (A) and MONTELONGO (FG). Correlations between lead, cadmium, copper, zinc and iron concentrations in frozen tuna fish. *Bull. Environ. Contam. Toxicol.* 36(4); 1986; 595-9

Oysters

- 3246 COOK (DW) and ELLENDER (RD). Relaying to decrease the concentration of oyster-associated pathogens. *J. Food Prot.* 49(3); 1986; 196-202

Oysters experimentally contaminated with indicator bacteria, *Salmonella* and poliovirus were used in relaying studies designed to measure microbial elimination under a variety of environmental conditions. Two factors, level of microorganism in the oyster and temperature of the water, were important in determining the length of time necessary to purge the contaminating organisms. Oysters under physiological stress cleansed at a slower rate than did healthy oysters. Based on the expected level of pathogen contamination in naturally polluted oysters, healthy relaid oysters were capable of cleansing in a 7-day period provided the temperature was above 10 C. These results were verified by following the elimination of indicator bacteria and poliovirus in commercially relaid oysters. Fecal indicator bacteria and enteric pathogenic bacteria were eliminated at similar rates but fecal coliform levels did not correlate with virus elimination. Relaying waters may contain some indicator bacteria and this study suggested that fecal coliforms may not be useful as end-point indicators for this method of oyster purification. AA

PROTEIN FOODS

- 3247 DATISH (VK), CHANDER (H) and RANGANATHAN (B). Enterocin typing of enterococci isolated from dried infant foods. *J. Dairy Sci.* 69(4); 1986; 983-9

One hundred and fifty enterococcal isolates recovered from 16 market samples of infant foods and 35 from other sources were characterized and subjected to enterocin typing with 18 indicator strains. Among 150 enterococcal isolates, 114% (76%) were able to be typed by the indicator strains. Although 24 enterocin patterns were observed with these enterococci, the most prevalent types were X-9, 2245, and 65-603. Occurrence of pattern X-9 either singly or in combination with many other types was most frequent. Many of the enterocin patterns in enterococcal isolates were recovered from samples of dairy water supply and hand washings of personnel working in a dairy plant that manufactured infant food; this suggests the possibility of these as sources of contamination. Enterocin typing of enterococci could prove useful in epidemiological studies. AA

FRUIT JUICES AND BEVERAGES

Apple juices

- 3248 PUPOVAC-VELIKONJA (A), VELIKONJA (J) and DURRIGL (A). The cultivation of *Aspergillus parasiticus* on apple juice. I. Influence of sodium benzoate and potassium sorbate on fungal growth and aflatoxin biosynthesis. *Z. Lebensmittel Unters. Forschung*. 182(4); 1986; 303-6 (German)

Sodium benzoate or potassium sorbate (100, 200, 300 and 400 mg/l) were added to cultures of *Aspergillus parasiticus* NRRL 2999 on apple juice (from syrup) and incubated quiescently at 25°C for 3, 6, 9, 12 or 15 days. The cultures were analyzed for pH, mycelial dry weight and accumulation of aflatoxin B1 and G1. The initial pH of 2.5 remained constant in all instances throughout the incubation period. Sodium benzoate, at all concentrations, suppressed fungal growth and stimulated the biosynthesis of G1, whereas little influence was exerted upon the accumulation of B1. Potassium sorbate stimulated fungal growth at 100 mg/l, while at all concentrations it considerably inhibited toxin production (no detectable amounts of B1 and 3 to 5 times less G1 than in controls). The concentration of G1 surpassed that of B1 without exception. AA

Raspberry juices

- 3249 POKORNY (J), DAVIDEK (J), PRNKA (V) and DAVIDKOVA (E). Nonparametric evaluation of graphical sensory profiles for the analysis of carbonated raspberry beverages. *Nahrung*. 30(2); 1986; 131-9

Sensory attributes of carbonated soft beverages were determined by graphical sensory profiles using 7 descriptors and their combinations. As the distribution of results was neither normal nor convertible into a normal one, sensory profiles were evaluated by nonparametric methods, either by double ranking or by multiples pair comparisons which were presented in form of diagrams as well. Small differences in sensory profiles were detected in this way. Carbonated raspberry beverages sweetened with a mixture of USAL (Aspartame hydrochloride) and saccharin had similar characteristics to that sweetened with sucrose, and were better than those sweetened by either saccharin or USAL alone. AA

Tea

- 3250 PETERSON (JH) and JENSEN (KG). Pesticide residues in black tea. *Z. Lebensmittel Unters. Forschung*. 182(6); 1986; 489-91

An investigation of residues of organochlorine and organophosphorous pesticides, as well as of a number of fungicides and of inorganic bromide in 99 samples of black tea taken on the Danish market is reported. The type of pesticide residues involved appear to be very uniform within each country of origin, whereas there are distinct differences between individual countries. Tea from Sri Lanka seems to contain less and fewer residues than tea from the other big tea producing countries. A great many of the samples contained α -HCH, lindane and DDT. The use of α -HCH and DDT is prohibited in Denmark. Only few other pesticides were detected and at a much lower frequency. None of the teas contained residues that may be regarded as being injurious to health. AA

Beer

- 3251 TIDBURY (CH). Technical progress in brewing. *J. Inst. Brew.* 92(2); 1986; 147-53
Discusses: Developments of browning - contributions of Sir Richard Schloman; ale and lager; some changes in technology; fermentation vessels; accelerated malting; hop products; wort clarification and wort boiling; and future developments envisaged. BSN
- 3252 MAULE (DR). A century of fermenter design. *J. Inst. Brew.* 92(2); 1986; 137-45
Discusses: Fermenters 100 years ago; Nathan vessels 1930; proliferation of cylindro-conical vessels 1963 onwards; alternative designs of batch fermenters; vessel height in relation to flavour and yeast growth; engineering and safety aspects of design; current developments in design of batch fermenters; continuous fermenters - early days; commercial use of continuously stirred vessels; development and commercial use of tower fermenters; comparison of novel heterogenous and homogenous designs; continuous fermentation - taking stock; and current use of continuous fermentation. BSN
- 3253 HAWTHORNE (DB), JONES (RD), BARRETT (PA), KAVANAGH (TE) and CLARKE (BJ). Methods for the analysis of C4 to C10 fatty acids in beer, wort and carbohydrate syrups. *J. Inst. Brew.* 92(2); 1986; 181-4
Methods developed for analysis of C4 to C10 fatty acids in beer, wort and carbohydrate syrups are based on the adsorption of aqueous samples on to solid supports, followed by removal of fatty acids by organic solvents. Methods are adequate for routine analysis and their reproducibility and recoveries of fatty acids are generally satisfactory. Problems normally encountered and solutions suggested during analysis of C4 to C10 fatty acids have been discussed. BSN
- 3254 GILSBACH (W). Gas-chromatographical determination of mono-halogen acetic acids in beer and wine-holding drinks. *Dtsch. Lebensmittel-Rundschau*. 82(4); 1986; 107-11 (German)
A method is described for detection and determination of traces of halogenated acetic acids in beer and wine products by gas chromatography with electron capture detector. The samples are extracted with ether. After derivatisation with ethanol or pentafluorobenzylbromide (PFBBBr), the acids are analyzed by use of capillary columns. The detection limit are 0.02 mg/l for chloroacetic acid, 0.001 or below 0.001 mg/l for bromo- and iodoacetic acid. AA
- 3255 SIMPSON (WJ). A comparison of methods for the microbiological sampling of compressed gases. *J. Inst. Brew.* 92(2); 1986; 154-8
- 3256 OKOYE (ZSC). Zearalenone in native cereal beer brewed in Jos metropolis of Nigeria. *J. Food Saf.* 7(4); 1986; 233-9
Native cereal beer, pito, brewed in Jos metropolis during the 1984 late planting season was screened for zearalenone content. Zearalenone was detected in pito from 28 of the 46 breweries in 13 of the 14 districts sampled, with mean concentration of 81.75 ± 50.16 $\mu\text{g/liter}$ and range 12.50-200.00 $\mu\text{g/liter}$. Aflatoxin B1 was detected in pooled extracts. There were other chloroform-soluble isolates but their identities could not be established. AA

Hops

- 3257 CLARKE (BJ). Hop products. (Review). *J. Inst. Brew.* 92(2); 1986; 123-30
Discusses: Terminology; hop products and their usage; hop powder/pellets; enriched hop powder/enriched hop pellets; speciality

hop powders/hop pellets; pellet utilisation; hop extracts; isomerised hop extracts; hop oil; analytical considerations; and the future. BSN

Malt

- 3258 HUDSON (OP). Malting technology (Review). J. Inst. Brew. 92(2); 1986; 115-22

Discusses: Development in malting general situation; biochemical and physiological aspects; and plant and process. BSN

- 3259 McCLEARY (BV) and NURTHEN (E). Measurement of (1→3) (1→4)- β -D-glucan in malt, wort and beer. J. Inst. Brew. 92(2); 1986; 168-73

A method developed for the quantification of (1→3)(1→4)- β -D-glucan in barley flour has been modified to allow its use in the measurement of this component in malt, wort, beer and spent grain. For malt samples, free D-glucose was first removed with aqueous ethanol. Quantification of the polymer in wort and beer samples involved precipitation of the β -glucan with ammonium sulphate followed by washing with aqueous ethanol to remove free D-glucose. Spent grain was lyophilised and milled and then analysed by the method developed for malt. In all cases, the β -glucan was depolymerised with lichenase and the resultant β -gluco-oligosaccharides hydrolysed to D-glucose with β -D-glucosidase. The released D-glucose was then specifically determined using glucose oxidase-peroxidase reagent. AA

- 3260 MALLESHI (NG) and DESIKACHAR (HSR). Studies on comparative malting characteristics of some tropical cereals and millets. J. Inst. Brew. 92(2); 1986; 174-6

Malts prepared from some of the tropical cereals and millets were evaluated for their suitability in weaning food formulations. Pearl millet and finger millet malts exhibited high α -amylase activity within 2-3 days of germination, while maize, sorghum, wheat and triticale malts showed high enzyme activity after 4-5 days of germination. Malting drastically lowered the paste viscosity of cereal flours especially millet. Finger millet malt had desirable flavour and taste besides high amylase activity. Wheat and triticale malts also had acceptable flavour. Rice malt was bitter and pearl millet malt developed rancid odour and bitterness within a week after preparation. AA

- 3261 JACOBSEN (T). Malting technology and the properties of malt: A cluster analysis study. J. Inst. Brew. 92(2); 1986; 177-80

A cluster analysis study of 72 malts produced from four varieties of barley malted under varying conditions, germination time and relative importance of the degree of steeping, temperature and kilning on the chemical and physical analysis of the malt. Seventy-two malt samples were produced from four barley varieties malted at two different degrees of steeping, two germination temperatures, two germination times, and two kilning temperatures. The malt samples were divided into 2 or 3 groups (clusters) by means of the Fuzzy Cluster Variety family of algorithms, applied to nine chemical or physical malt analyses. Each cluster could be characterized by certain mean values for the laboratory analyses and also by a particular set of technological parameters. The degree of steeping was the most important of these parameters. Laboratory analyses such as fine/coarse difference and friability were able to discriminate between a high or low degree of steeping. The cluster with a high degree of steeping could be further divided into two subclusters, with different kilning temperature. The DMG precursor discriminated between these two kilning temperatures. AA

Worts

- 3262 ORMROD (IHL). Modern brawhouse design and its impact on wort production. *J. Inst. Brew.* 92(2); 1986; 131-6

Wines

- 3263 FARROSO (CG), TORRIJOS (RC) and PEREZ-BUSTAMANTE (JA). Evolution of phenolic acids and aldehydes during the different production process of "Fino" sherry wine. *Z. Lebensmittel-Unters Forschung.* 182(5); 1986; 413-3

- 3264 BATTAGLIA (R) and MITISKA (J). Specific detection and determination of azide in wine. *Z. Lebensmittel-Unters Forschung.* 182(6); 1986; 501-2
In view of false-positive results obtained with the azide-detection method based on complex-formation with ferric ions, a specific liquid-chromatographic azide determination was adapted for the analyses of wine. The samples are distilled free of alcohol under alkaline conditions and acidified, and a new distillate is collected. The distillate is buffered (pH 4.7) and treated with 3,5-dinitrobenzoylchloride and the derivative thus formed is detected and determined by HPLC. AA

- 3265 WERKHOF (P) and BRETSCHNEIDER (W). Gas chromatographic determination of diethylene glycol in wine, grape juice, and grape juice concentrates. *Z. Lebensmittel-Unters. Forschung.* 182(4); 1986; 298-302 (German)
The method involves continuous extraction of diethylene glycol with ethyl acetate, by means of a rotation perforator, followed by gas-liquid chromatography on a new generation of chemically bonded stationary phases on fused silica, together with an appropriate, modern, cold on-column injection system, coupled with an auto-analyzer and a retention gap. The precision of the method (or coefficient of variation) was 3.9% and the detection limit 5 mg/l. Recovery of diethylene glycol from wine was, on an average, 9-8.8%, and from grape juice it was 96-109%. KMD

- 3266 RAPP (A), SPRAUL (M) and HUMPFER (E). Determination of diethylene glycol in wine with ^{13}C -NMR-spectroscopy. *Z. Lebensmittel-Unters. Forschung.* 182(5); 1986; 419-21 (German)
A procedure for the structure specific determination of diethyleneglycol from wine is described. The analysis can be performed without pretreatment of the samples. The detection limit is 10 mg/l. AA

- 3267 ROTTSAHL (H) and STROMMER (R). Contributions to the determination of diethylene glycol in wine. I. The gas chromatographical method. II. The HPLC-method. *Dtsch. Lebensmittel-Rundschau.* 82(5); 1986; 148-50 (German)
A gas-chromatographical determination method is presented here: After the wine sample has been dried on silica gel, the DEG is desorbed with acetone and, after silylization, is separated on an OV-101 capillary column. Detection limit < 10 mg of DEG/l. AA

- 3268 RAPP (A), ENGEL (L) and ULLEMEYER (H). Determination of mono- and diethylene glycol in wine by two dimensional gas chromatography. *Z. Lebensmittel-Unters Forschung.* 182(6); 1986; 498-500 (German)
By the aid of two-dimensional gas chromatography and the application of the live-GC-technic monoethylen glycol (MEG) and diethylen glycol (DEG) from wine can be separated and detected. After the treatment of samples ("Salting-out") the indication value for MEG is 10 mg/l and 1 mg/l for DEG. The security of small quantities occurs with GC-MS-coupling. AA

OILS AND FATS

- 3269 MAHIOUT (S) and VOGELPOHL (A). Migration in high viscous mixtures. *Fette Seifen Anstrichm.* 88(2); 1986; 56-62 (German)

To improve the knowledge of material exchange processes in high viscous mixtures, tests for fluid dynamics and materials migration were carried out with various sieve bottoms. The measuring results show that the separation capacity of a sieve bottom can be significantly increased by suitable choice of processing conditions and the sieve bottom geometries. AA

Oils

- 3270 SEN GUPTA (AK). Novel developments in refining of edible oils. *Fette Seifen Anstrichm.* 88(3); 1986; 79-86 (German)

The requirements for the physical refining of edible oils are analyzed. One major requirement is the more or less complete removal of phospholipids, lipoproteins, free and bound carbohydrates, traces of heavy metals and organic pigments. Acid degumming processes, e.g. Super-Degumming and Special-Degumming as also the Alcon-Process are examined on their mechanism and efficiency on the background of the above mentioned requirements. Additionally, the process of ultrafiltration of edible oil miscella is presented as a novel development, which fulfills the requirements for physical refining very efficiently. The ultrafiltration process, which exploits the principle of reversed osmosis, removes phospholipids and other numerous impurities present in crude oils in one single unit-process. The principle and the modification possibilities of this process are discussed. AA

- 3271 BIEBER (MA). Lack of oestrogen-like activity in commercially refined vegetable oils. *Food Chem. Toxicol.* 24(3); 1986; 251-3

Commercially refined corn, safflower, sunflower and soya-bean oils, as well as lard and beef tallow, were fed to pre-pubertal female mice at a level of 5 or 20% of a semi-synthetic diet to assess whether they exhibited any oestrogen-like activity, as measured by changes in uterine weight or in the ratio of uterine weight to body weight. No measureable oestrogen-like activity was observed, in contrast to the effects in positive-control animals treated with 5, 10 or 15 ppb diethylstilboestrol. This finding contradicts an earlier report in the literature. It also shows that oestrogen-like activity in a commercially refined oil is not likely to be a variable in the complex mechanism of the dietary modulation of induced preast-tumour growth. AA

- 3272 SOTIRHOS (N), HO (C-T) and CHANG (SS). HPLC analysis of oxidative and polymerized decomposition products in commercial vegetable oils and heated fats. *Fette Seifen Anstrichm.* 88(2); 1986; 45-8

A high performance liquid chromatographic (HPLC) method has been developed to analyze oxidative and polymerized decomposition products in commercial vegetable oils and heated fats. Five commercial vegetable oils were analyzed, and similarities and differences were observed. Four soybean oil samples from different manufacturers also showed differences. Soybean oil heated at 185°C was collected periodically and analyzed. As the heating time increased, the oxidation and polymerization products also increased. Used frying fat samples from a commercial fried chicken manufacturer were analyzed. The frying oil quality reached an equilibrium during three days of operation, because the oil lost in frying was replenished daily with fresh shortening. AA

- 3273 WOESTENBURG (WJ) and ZAALBERG (J). Determination of the oxidative stability of edible oils - interlaboratory test with the Automated Rancimat method. *Fette Seifen Anstrichm.* 88(2); 1986; 53-6

- 3274 KRISHNANGKURA (K). A simple method for estimation of cetane index of vegetable oil methyl esters. *J. Am. Oil Chem. Soc.* 63(4); 1986; 552-3

This article illustrates a simple method for estimation of cetane indexes of vegetable oil methyl esters from their saponification and iodine numbers. The range of the calculated values covers all the cetane numbers of vegetable oil methyl esters determined experimentally, when it was applied to individual fatty acid methyl esters from C_8 to C_{24} , a straight line parallel to that of Klopferstein was obtained. AA

- 3275 BLUMENTHAL (MM) and STOCKLER (JR). Isolation and detection of alkaline contaminant materials (ACM) in used frying oils. *J. Am. Oil Chem. Soc.* 63(5); 1986; 687-8

Alkaline contaminant materials are formed in frying oils during cooking. The ACM can be eluted from the same International Union of Pure and Applied Chemists - Association of Official Analytical Chemists (IUPAC-AOAC) silica gel column used to determine polar materials in frying oils. The ACM are eluted with methanol after "non-polar" and "polar" fractions already have been eluted from the column. A residue of silica gel in the methanol eluate must be insolubilized before the ACM can be identified and quantitated. IR was used to identify sodium oleate as the major constituent of ACM from a set of restaurant generated frying oil samples. AA

Cottonseed oils

- 3276 SALEH (MA), AHMED (KA), SHARAF (AN) and ADDEL LATIF (MS). Mutagenicity of heated cottonseed frying oil. *J. Food Safety.* 7(4); 1986; 203-213

A control experiment showed that cottonseed oil used in frying falafel developed significant mutagenic activity. As a result, one hundred samples of fresh and used cottonseed oil employed commercially for frying falafel were collected from restaurants in thirteen major cities of Egypt. Samples were examined for mutagenic activity using the *Salmonella typhimurium* assay with and without S9. Six of the heated oil samples showed significant mutagenic activity. None of the fresh unheated oil samples were mutagenic. *Salmonella typhimurium* TA 102 gave a higher response than did either TA 100 or TA 98. Peroxide, hydroxyl, acid and conjugated diene values were much higher for mutagenic samples. Iodine values, however, were lower. Liquid chromatography fractionation revealed that the mutagenicity was concentrated in the polar fraction. The column fraction having the highest mutagenic activity was further examined by chromatographic and spectroscopic techniques. AA

Essential oils

- 3277 FARAG (RS), SALEM (H), BADEI (AZMA) and HASSANEIN (DE). Biochemical studies on the essential oils of some medicinal plants. *Fette Seifen Anstrichm.* 88(2); 1986; 69-72 (German)

Some physical and chemical constants and chemical composition of the essential oils of three Egyptian plants namely thyme, rosemary and sage belonging to the Labiateae family were determined. Gas-liquid chromatographic analysis of thyme, rosemary and sage essential oils indicated the presence of 13, 12 and 8 compounds representing 63.75%, 82.44% and 99% of the total volatile substances, respectively. The most prevalent volatile components of thyme, rosemary and sage oils were thymol, α -pinene and thujone, respectively. The anti-microbial

examination for these oils against some micro organisms showed that thyme oil had the greatest effect followed by sage and rosemary oils. AA

Palm oils

- 3278 KHOR (HT), TAN (NH) and CHUA (CL). Lipase-catalyzed hydrolysis of palm oil. J. Am. Oil Chem. Soc. 63(4); 1986; 538-40

The hydrolysis of palm oil, palm olein and palm stearin, soybean oil, corn oil and peanut oil by the commercial lipase from *Candida rugosa* (formerly known as *C. cylindracea*) was studied. The optimal conditions for the hydrolysis of palm oil by the lipase were established. The lipase from *C. rugosa* exhibits an optimal activity at 37°C and at pH 7.5. The optimal oil to hexane ratio is 1 g of oil to 0.5 ml hexane. The rate of hydrolysis of palm oil by the lipase is linear on a logarithmic scale. Under the same conditions, palm oil and palm olein were hydrolyzed at the same rate, whereas palm stearin was hydrolyzed much more slowly. AA

Rapeseed oils

- 3279 ZAJIC (J), BARES (M), VOLHEJN (E) and CMOLIK (I). The condition influence on the content of phospholipids in pressed rapeseed oil. Fette Seifen Anstrichm. 88(2); 1986; 67-9 (German)

The influence of the conditioning temperature and the humidity of the rapeseed which was to be conditioned, on the migration of phospholipids into raw oil was investigated. The increase of the humidity content from 6 to 8 weight % had an extent influence on the total content of the phospholipids. The increase of the temperature from 70°C to 80°C showed no essential influence, a further temperature rise upto 95°C led to an increase of phospholipids in oil of 1/3. The corresponding relations are of great importance for oil storage as well as for the balance of the yield and of the losses. AA

- 3280 GROSSKLAUS (R). Nutritional-physiological evaluation of rapeseed oil and rapeseed protein. Dtsch. Lebensmittel-Rundschau. 82(6); 1986; 175-82 (German)

New findings made during the last ten years indicate that health risks from the consumption of erucic acid (C_{22} monoenoic acids) can be excluded with a very high degree of probability. Protein concentrates or isolates from rapeseed are considered to be of high biological value, and superior even to casein and soyabean protein. But preparation of rapeseed protein concentrates inexpensive, because of the need to remove anti-nutritional factors like glucosinolates, phytate, etc. This situation can be improved by producing new rapeseed cultivars, having low contents of fibre and glucosinolates. The use of rapeseed protein for human consumption will depend, however, on the results of a risk-benefit analysis. KMD

Soybean oils

- 3281 SINRAM (RD). Nephelometric determination of phosphorus in soybean and corn oil processing. J. Am. Oil Chem. Soc. 63(5); 1986; 667-70

A procedure to measure phosphorus content of soybean and corn oil samples had been developed using nephelometry (turbidity). The method uses the relationship between phosphorus level due to phosphatides in vegetable oil and turbidity formed in phosphatide mixtures. The rapid 10-minutes determination of phosphorus in process samples is 30 times faster than colorimetric methods. Phosphorus vs. turbidity data formed nearly linear relationships for crude, degummed, once-refined, bleached and deodorized soybean and corn oil process samples.

- 3282 WHITE (PJ) and ARMSTRONG (LS). Effect of selected oat sterols on the deterioration of heated soybean oil. *J. Am. Oil Chem. Soc.* 63(4); 1986; 525-9

Two sterol fractions of different purity, each containing both Δ^5 -avenasterol and β -sitosterol, were separated from oat oil, and their antioxidant effects studied in soybean oil at 180°C. Fatty acid changes, conjugated diene formation and polymerization were monitored in all samples. All heated oils with added oat-sterol fractions containing Δ^5 -avenasterol deteriorated more slowly than did the controls. Oil with added pure β -sitosterol was altered at a rate similar to that of the controls. AA

- 3283 PEIJIBETS (MJH), EBBENHORST-SELLER (G) and RUISCH (J). Deep fat Finish-frying of French fries in unhydrogenated refined soybean oil. *Fette Seifen Anstrichm.* 88(2); 1986; 48-52

The suitability of unhydrogenated soybean oils (55% C18:2 and 7% C18:3) for commercial, small-scale, heavy-duty deep-fat frying has been investigated in a laboratory experiment with four unhydrogenated soybean oils, a sunflower oil (68% C 18:2) and a hydrogenated soybean fat (0% C18:2). The frying procedure used simulated commercial, heavy-duty deep-fat Finish-frying of French fries, and comprised intermittent frying and cooling on five consecutive days. Analysis of the hydrolysis, oxidation and polymerization of the oils and sensory quality of the finish-fried french fries established that the sunflower oil deteriorated more rapidly than the soybean oils. However, the hydrogenated soybean fat was much more stable than the oils. With regard to a limit of 1% polymeric triglycerides, the frying life of hydrogenated soybean fat was at least twice than of unhydrogenated soybean and sunflower oils. Two of the soybean oils were more stable than the other two. Thus, it was concluded that unhydrogenated soybean oils are no less suitable for heavy-duty deep fat than other highly polyunsaturated oils. However, frying conditions, such as temperature, surface volume ratio and intermittent operation need to be carefully controlled, and the oil needs to be replaced more frequently. AA

Tempeh oil

- 3284 STANIL (HD) and SIMS (RJ). Tempeh oil - Antioxidant (?). *J. Am. Oil Chem. Soc.* 63(4); 1986; 555-6

Previous workers have claimed that tempeh oil contains a potent fat antioxidant. These claims were based solely on measurements of peroxide value (PV) during accelerated storage of tempeh oil alone or as an additive to other unsaturated oils. Oxygen absorption rate measurements indicate that tempeh oil actually has weak prooxidant activity. Fermentation of soybeans to produce tempeh generates high levels of free fatty acids. FFA promote rapid decomposition of peroxides so that the levels in the oil never increase substantially during oxidation. Consequently, PV is a poor index of oxidation rate in oils which are high in FFA. Our experience with tempeh oil does not confirm earlier observations of its efficacy as an antioxidant. AA

Fat

- 3285 BAGAR (M), HASSANIEN (FR) and EL-MAHIZANGY (A). Studies on the possibility of producing fats from food wastes by using microorganisms. II. Physical and chemical properties of fat produced from different fungi. *Fette Seifen Anstrichm.* 88(2); 1986; 72-5

The physical properties of fats produced from *Aspergillus niger*, *Aspergillus oryzae*, *Penicillium roqueforti* and *Rhizopus arrhizus* including melting point, refractive index and specific gravity were studied. Chemical properties such as fat constants, acid number, peroxide value, saponification value and iodine value, fat composition

and fatty acid composition for each oil were also investigated. AA

3286 ARENS (M) and KROLL (S). Survey by a working party of the DGF, 95th report: German Standard methods for investigation of fats, fatty products and related materials, 72th report: General informations. I. Fette Seifen Anstrichm. 88(3); 1986; 91-5 (German)

3287 HADEBALL (K), KROLL (J) and FRANZKE (CL). Synthesis and properties of succinylated monoglycerides. Nahrung. 30(2); 1986; 209-11 (German)

3288 HAU (L-B) and NAWAR (WW). Radiolysis of lipids in monolayers. I. Saturated fatty acids. J. Am. Oil Chem. Soc. 63(5); 1986; 676-9

3289 ARENS (M) and KROLL (S). Survey by a Working Party of the DGF, 94th report: German Standard Methods for investigation of fats, fatty products and related materials 71th report: Analysis of fats. XXII. Fette Seifen Anstrichm. 88(2); 1986; 43-5 (German)

3290 CROON (L-B), ROGSTAD (A), LETH (T) and KIUTAMO (T). A comparative study of analytical methods for quality evaluation of frying fat. Fette Seifen Anstrichm. 88(3); 1986; 87-91

Four quick-test methods (the Foodoil sensor, RAU-Test, Fritest and Spot test) and two ordinary laboratory methods (the free fatty acids and GLC determination of triglyceride dimers) were compared to a standard method (column chromatographic determination of polar compounds). One hundred samples collected from fast food shops and restaurants were included in the investigation. The Foodoil sensor showed the highest correlation to the standard method (c.f. = 0.94). The RAU-Test Fritest and Spot test were also well correlated to the standard method. It was easier to compare the colour of the reaction mixtures to the colour scale of the RAU-Test than to that of the Fritest. The amount of free fatty acids were found to be an unreliable indicator of deteriorated frying fat. The triglyceride dimers could not be quantified, but assessment by visual comparison of the peak pattern in the chromatogram corresponded well with the results of the standard method. AA

3291 NIELSEN (KS). Drying condensation - A new procedure in the fatty acid technology. Fette Seifen Anstrichm. 88(3); 1986; 96-7 (German)

Drying condensation is a procedure where the condensates condense as ice on ammonia cooled tubes at about -10°C. Traces of fatty acids and other volatile substances precipitate in the film, too. The inert gases can be compressed by positive blowers up to atmospheric pressure. Every 30 minutes cooling of the surfaces is automatically switched off and the film is melted off. This method represents an important reduction of the energy consumption. The occurring small amounts of condensate can easily be separated into water and fatty acids. Thus environmental pollution by injection condensers is abolished. In this work experiences are reported which have been obtained within one working year on a large scale fatty acid fractionation plant with such a drying condensation vacuum system at DS-Industries, Copenhagen. AA

3292 LAUBLI (MW) and BRUTTEL (PA). Determination of the oxidative stability of fats and oils: Comparison between the active oxygen method (AOCS Cd 12-57) and the Rancimat method. J. Am. Oil Chem. Soc. 63(6); 1986; 792-5

The Rancimat method is based on the conductometric determination of volatile degradation products and features automatic plotting of the conductivity against time. The evaluation is performed graphically after completion of the experiment. The labour required for this method is probably less as it is not necessary to perform titra-

tions at regular intervals. In the determination of the peroxide values of six samples at three temperatures, ca 15l mixed solvent and chemicals valued at SFr. 400 (ca \$180 US) were consumed. The induction times (t_i) determined with both methods using six different fats and oils show a good correlation (slope 1.005, correlation coefficient 0.987). The Rancimat method thus yields results equivalent to the AOCS Method Cd 12-57, but offers a real alternative for the determination of oxidative stabilities owing to the appreciable saving in labour. AA

- 3293 CHRISTOPOULOU (CN) and PERKINS (EG). High performance size exclusion chromatography of fatty acids, mono-, di- and triglyceride mixtures. *J. Am. Oil Chem. Soc.* 63(5); 1986; 679-84

- 3294 GROMPONE (MA) and MOYNA (R). Geometric isomerization of fatty acids with nickel catalyst. *J. Am. Oil Chem. Soc.* 63(4); 1986; 550-51

- 3295 PANDIET (R), MANDAL (S) and GADGIL (DR). A comparative fatty acid profile of seeds rich in oleic and linoleic acid with corresponding calli. *J. Am. Oil Chem. Soc.* 63(4); 1986; 541-3

A comparative study was made of the fatty acid composition of the total lipid extracted from cotyledons and the corresponding calli of five species of *Solanum* and two varieties of *Carthamus tinctorius*. The investigation revealed a closer resemblance in the fatty acid composition of callus cells than that of the cotyledons of different species of *Solanum*; in *C. tinctorius* fatty acid composition of calli was influenced by the character of the original material from which calli were derived. AA

- 3296 STAMATOV (SE). Radiolytic resistance of DL- α -tocopherol in lipid systems with different degrees of unsaturation. *J. Am. Oil Chem. Soc.* 63(4); 1986; 546-9

The radiolytic resistance of DL- α -tocopherol irradiated by low (10^4 rad), medium (10^5 rad) and high (10^7 rad) doses of gamma rays at a molar ratio of 1:1, $1:1 \times 10^{-2}$ and $1:1 \times 10^{-3}$ mole in methyl laurate, methyl oleate, methyl linoleate, methyl linolenate and benzene (chosen as solvent media) has been studied. Under the experimental conditions stated, it has been established that, contrary to ordinary autoxidation, the unsaturated lipid systems exert a progressive, protective effect on DL- α -tocopherol as the number of double bonds increases. When the DL- α -tocopherol was in a pure state, for example in benzene and in methyl esters of the fatty acids at a molar ratio 1:1, no effect of ionizing radiation was detected. AA

- 3297 SCHLICHTER (J), GARTI (N) and SARIG (S). Heat capacity of tristearin in the presence of food emulsifiers. *J. Am. Oil Chem. Soc.* 63(6); 1986; 788-91

The specific heats of tristearin in the presence of some food emulsifiers were determined by differential scanning calorimetry. Solid emulsifiers show Cp curves different from those of pure tristearin, indicating that a new mixed crystal has been obtained through the incorporation of the surfactant within the fat. AA

- 3298 VARELA (G), MOREIRAS VARELA (O), RUIZ ROSO (D) and CONDE (R). Influence of repeated frying on the digestive utilisation of various fats. *J. Sci. Food Agric.* 37(5); 1986; 487-90

Three types of fat, olive oil, soybean oil and a solid cooking fat were used to fry potatoes, lean beef or sardines. The heating cycle was carried out once and repeated ten times and the true digestibility (TD) and energy digestibility (ED) determined by feeding trials on rats. The results showed very little change in either measurement compared with the fresh, unheated fats. Discarded olive oil

from an industrial fryer was also examined and found to be only slightly lower in TD and ED than after ten cycles in the laboratory. AA

- 299 APELT (J). Processing and plant feasibilities for fat addition during the production process of mixed food. *Fette Seifen Anstrichm.* 88(3); 1986; 110-14 (German)

In the production of high energy containing mixed food, fats play an important role. However, limits are set by processing. Thus the content of free added fats before pressing is even under favourable conditions only between 3 and 5%. Investigation showed that long time conditioning did not give the expected effect. Only by addition of molasses a higher increase is achieved. If a higher fat content in the mixed food product is desired, additional technical measures are demanded. Spraying of fats on a continuous pellet flow belongs in this connection to the most common methods. The results of the research project are reported. AA

Cupania anacardioides

- 3300 MUSTAFA (J), GUPTA (A), AGARWAL (R) and OSMAN (SM). *Cupania anacardioides*: A rich source of cyanolipids. *J. Am. Oil Chem. Soc.* 63(5); 1986; 671-2

Lard

- 3301 COXON (DT), PEERS (KE), GRIFFITHS (NM) AND CHAN (HW S). The oxidative stability of lard at -20 C. Evidence for a synergistic prooxidant effect of copper and curing salts. *J. Sci. Food Agric.* 37(6); 1986; 567-72

Various additives singly or in combination were added to lard and stored for 16 weeks at -20 C. It was observed that there was progressive oxidative deterioration of the lard with noticeable rancidity developing after 8 to 16 weeks at -20 C when water, sodium chloride, sodium nitrate, sodium nitrite and copper were present in combination. KAR

Munguba

- 3302 SCHUCH (R), AHMAD (F) and MUKHERJEE (KD). Composition of triacylglycerols containing cyclopropene fatty acids in seed lipids of Munguba (*Bombax munguba* Mart.). *J. Am. Oil Chem. Soc.* 63(6); 1986; 778-83

Sal fat

- 3303 YELLA REDDY (S) and PRABHAKAR (JV). Study on the polymorphism of normal triglycerides of sal (*Shorea robusta*) fat by DSC. I. Effect of diglycerides. *J. Am. Oil Chem. Soc.* 63(5); 1986; 672-6

The effect of diglycerides (DG) on the phase transition of various polymorphic forms of normal triglycerides (TG) of sal fat was investigated by differential scanning calorimetry. Three levels of DG, 5, 10 and 15%, were used. DG delayed the phase transition of lower melting crystal forms to higher forms of TG when the samples were brought to a congealed state by rapid cooling (20 C./minutes) and heated at rates ranging from 1.25 to 10 C./minutes the extent depended on the level of DG and the rate of heating. As the level of DG and the rate of heating increased, the delay in phase transition of crystal forms I \rightarrow II \rightarrow III was more pronounced. The phase transition of crystal forms I, II and III to form IV was delayed at 5 and 10% levels of DG, while at the 15% level the phase transition of form I to higher forms was completely stopped when the samples were tempered at 0 C for 10 C./minutes. DG at 10 and 15% levels retarded

the phase transition of form IV to the most stable (V) form of TG when the samples were tempered at 0 C for 1 hr followed by 3 hr at 26 C. AA

SPICES AND CONDIMENTS

- 3304 GRECZ (N), AL HARITHY (R) and JAW (R). Radiation sterilization of spices for hospital food services and patient care. *J. Food Safety*. 7(4); 1986; 241-55

- 3305 GECAN (JS), BANDLER (R), GLAZE (LE) and ATKINSON (JC). Microanalytical quality of ground and unground marjoram, sage and thyme, ground allspice, black pepper and paprika. *J. Food Prot.* 49(3); 1986; 216-21

A 3-year national retail market survey was made to determine the sanitary quality of ground and unground marjoram, sage and thyme, and ground allspice, black pepper and paprika. The Official Methods of the Association of Official Analytical Chemists were used to count light filth such as insect fragments, rodent hair fragments, feather barbules, mites, thrips and aphids. Insect fragments were the most frequently encountered defect, with count means ranging from 7.8 for 10 g of ground allspice to 287.7 for 10 g of ground thyme. The per cent of samples containing insect fragments ranged from 70.8 to 99.6 for ground allspice and ground thyme, respectively. Other counts ranged as follows: rodent hair fragments, 0 to 200 (for 10 g of ground sage); feather barbules, 0 to 60 (for 10 g ground sage); mites, 0 to 999 (for 25 g of unground thyme); thrips, 0 to 99 (for 25 g of unground thyme); aphids, 0 to 116 (for 10 g of ground sage). Howard mold counts of paprika ranged from 0 to 99%, with a mean of 2.8%. AA

Capsicum

- 3306 GOVINDARAJAN (VS). Capsicum - Production, technology, chemistry and quality - Part II. Processed products, standards, world production and trade. *CRC Crit. Rev. Food Sci. Nutr.* 23(3); 1986; 207-88

Discusses: Processed products; grades of Hungarian paprika and description of fruits for grades and sensory characteristics as a powder, chilli powder storage for 90 days in different packaging materials; capsaicinoids content and oleoresin yield of some world varieties of chillies; oleoresin production; characteristics of oleoresin; capsaicinoids and colour in component parts of Indian chilli varieties; trade types and prices of oleoresins; adulteration in capsicum and its products and detection; standards and grade specifications; world production and trade in chillies; trade types of capsicums - chillies and paprika; export of oleoresin chillies (capsicum) from India; whole dried chillies - average annual price of imports into the USA. BSN

Garlic

- 3307 ABOUL-ENEIN (AM). Inhibition of tumour growth with possible immunity by Egyptian garlic extracts. *Nahrung*. 30(2); 1986; 161-9

Pepper

- 3308 GANESH BHAT (D) and CHANDRASEKHARA (N). Lack of adverse influence of black pepper, its oleoresin and piperine in the weanling rat. *J. Food Safety*. 7(4); 1986; 215-23

Black pepper, its oleoresin or its active principle piperine fed to rats at doses 5 to 20 times normal human intake did not cause any adverse effect on: growth of food efficiency ratio and organ weights; RBC, WBC and differential counts; the levels of blood constituents

like hemoglobin, total serum proteins, albumin, globulin, sugar and cholesterol; the levels of serum aminotransferases and phosphatases; and fat and nitrogen balance. AA

SENSORY EVALUATION

- 3309 McBRIDE (RL). Hedonic rating of food. Single or side by side sample presentation? J. Food Technol. 21(3); 1986; 355-63

Taste panels made hedonic ratings of the sensory properties of four grades of sultanas, evaluated as two pairs (Experiment 1), three chicken casserole products (Experiment 2), and two cola drinks (Experiment 3). In each experiment, two modes of samples presentation were compared: single presentation; where panellists rated only one sample per session; and side-by-side presentation, where the samples were presented simultaneously. In Experiment 1, hedonic ratings from single presentation suggested there were no significant differences between grades, whereas the side-by-side presentation did indicate significant differences. This discrepancy between modes of presentation was not noted in Experiments 2 and 3. Selective operation of methodological bias in category rating might possibly account for the findings. AA

- 3310 GOLOVNYA (RV), SYMONIA (LA), YAKOVLEVA (VN) and ENIKEEVA (NG). List of chemical substances and uniform procedure for selection of panelists by their ability to recognize odours. Nahrung. 30(2); 1986; 111-8

In order to provide a uniform procedure for selection of panelists by their ability to recognize odours, 12 chemical compounds which can easily be purified and are stable in the pure form are selected: they are widely used in the food industry; diacetyl, isoamylacetate, ethanol, vanillin, anisaldehyde, m-cresol, acetic acid, n-butyric acid, methylbutyl sulphide, isoamyl alcohol, ammonia, camphor. A method for the preparation of aqueous and ethylene glycol solutions of these compounds and the samples for testing has been also developed. It ensures standard procedure for odour evaluation of the above-mentioned compounds by candidates for the panel. AA

- 3311 ERHARDT (V), ROTHE (M), SEPPELT (B) and SPECH (M). The application of multivariate mathematical-statistical methods to the solution of problems in nutrition theory, nutritional economics and food technology. Part 5. Cluster analysis as a tool for proofing sensory attributes. Nahrung. 30(2); 1986; 119-30

The task of the test program was the replacement of more subjective and time-consuming sensory methods by instrumental or chemical ones. In the case of meat flavour concentrates (MFC) and their burnt-bitter flavour the cluster analysis resulted in the following: The test program was based on 20 samples produced by statistical plans (central composite design for 3 explanatory variables). Starting with 10 sensory and 40 instrumental methods, the latter have been reduced to 10 methods considering the suppositions for application of the cluster analysis. The 20 samples were tested on one side by a trained sensory panel for the intensity of the "burnt-bitter" flavour and parallelly by the selected 10 instrumental values. This resulted in both cases in the differentiation into 3 clusters with significant differences. For evaluation of MFC as to their "burnt-bitter" flavour, it was shown that the sensory evaluation can be replaced or supported by analytical data successfully. Thus cluster analysis is a useful tool for this purpose delivering transparent results. AA

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

- 3312 CLINE (LD), PRESS (JW) and FLAHERTY (BR). Protecting uninfested packages from attack by *Cadra cautella* (Lepidoptera: Pyralidae) with the parasitic wasp *Venturia canescens* (Hymenoptera: Ichneumonidae). J. Econ. Entomol. 79(2); 1986; 418-20

Significantly fewer bags of each type were infested by *C. cautella* dispersing from adjacent infested food debris when *V. canescens* was present. Numbers of moth larvae in the open, folded, and laped bags were also significantly reduced when the parasites were present. KAR

- 3313 GRIMNES (KA) and HAPP (GM). A monoclonal antibody against a structural protein in the spermatophore of *Tenebrio molitor* (Coleoptera). Insect Biochem. 16(4); 1986; 635-43

- 3314 HOWARD (RW), JURENYA (RA) and BLOMQUIST (GJ). Prostaglandin synthetase inhibitors in the defensive secretion of the red flour beetle *Tribolium castaneum* (Herbst) (Coleoptera: Tenebrionidae). Insect Biochem. 16(5); 1986; 757-60

- 3315 ROUSH (RT) and MILLER (CL). Considerations for design of insecticide resistance monitoring programs. J. Econ. Entomol. 79(2); 1986; 293-8

Monitoring is critical to resistance management, but there has been very little discussion in the literature about the statistical design of monitoring programs. Some general considerations show that the LD_{50} a standard measure for resistance monitoring is very inefficient compared with diagnostic tests that accurately distinguish between resistant and susceptible individuals. Even with diagnostic doses, sample sizes at any given local must often be very large (on the order of hundreds of individuals per population) to reliably detect resistant when it is present at frequencies of <10%. For those species where it is difficult to collect large numbers of individuals, resistance detection may not be a practical composition of resistance management. AA

- 3316 HIGHLAND (HA) and CLINE (LD). Resistance to insect penetration of food pouches made of untreated polyester or permethrin treated polypropylene film. J. Econ. Entomol. 79(2); 1986; 527-9

Untreated polyester or permethrin-treated polypropylene food pouches were exposed to large populations of *Tribolium castaneum* (Herbst), *Rhyzopertha dominica* (F.), *Lasioderma serricorne* (F.), and *Cadra cautella* (Walker). Also included were control pouches made of untreated polypropylene film, and standard pouches made of polyethylene film 254 μ m thick. The pouches contained a variety of foods sealed in polyester film laminates. *T. castaneum* failed to penetrate the polyester and permethrin-treated film during 24 months of storage. *C. cautella* did not penetrate polyester film; penetration of permethrin-treated film by *C. cautella* was found only at 24 months. *L. serricorne* did not penetrate polyester film and penetrated permethrin-treated film and polyethylene at similar low rates. *R. dominica* penetrated almost all polyethylene pouches, all untreated polypropylene pouches, about half the polyester pouches, and ca. 19% of the permethrin-treated pouches. In general, the order of descending resistance to penetra-

tion by the four species was permethrin-treated filk, polyester fil, polyethylene film, and polypropylene film. AA

BIOCHEMISTRY AND NUTRITION

- 3317 LATUNDE DADA (CG) and NEALE (RJ). Review: Availability of iron from foods. *J. Food Technol.* 21(3); 1986; 255-68
- 3318 HENNIG (A), ZANDER (R) and GRUHN (K). On the digestibility and utilization of labelled protein of feeds and foods rich in dietary fibres. *Nahrung.* 30(2); 1986; 213-5

TISSUE CULTURE

Nil

TOXICOLOGY AND HYGIENE

- 3319 LABORDA (R), DIAZ-MAYANS (J) and NUNEZ (A). Nephrotoxic and hepatotoxic effects of chromium compounds in rats. *Bull. Environ. Contam. Toxicol.* 36(3); 1986; 332-6

- 3320 DRIVER (HE) and MCLEAN (AEM). Dose-response relationships for initiation of rat liver tumours by diethylnitrosamine and promotion by phenobarbitone or alcohol. *Food Chem. Toxicol.* 24(3); 1986; 241-5

- 3321 KEMPPAINEN (BW), RILEY (RT), PACE (JG) and HOERR (FJ). Effects of skin storage conditions and concentration of applied dose of $(^3\text{H})\text{T-2}$ toxin penetration through excised human and monkey skin. *Food Chem. Toxicol.* 24(3); 1986; 221-7

Penetration of $(^3\text{H})\text{T-2}$ toxin through excised human and monkey skin stored at -60°C was faster than through human and monkey skin stored at 4°C , respectively. The permeability of refrigerated human skin was 34% of the permeability of refrigerated monkey skin. Increasing the concentration of $(^3\text{H})\text{T-2}$ toxin applied to the refrigerated monkey skin increased the amount of $(^3\text{H})\text{T-2}$ toxin penetrating the skin and enhanced the efficiency of penetration. Metabolites of $(^3\text{H})\text{T-2}$ toxin were identified in the receptor fluid bathing the dermal side of the excised human and monkey skin. AA

- 3322 WEI (R-D), BISCHOFF (W) and CHU (FS). Production and characterization of antibody against 3'-OH-T-2 toxin. *J. Food Prot.* 49(4); 1986; 261-71

Antibody raised against T-2 toxin cross-reacted poorly with 3'-OH-T-2 toxin. A new immunogen was prepared by conjugation of hemisuccinate (HS) of 3'-OH-T-2 toxin to bovine serum albumin (BSA). Antibodies against 3'-OH-T-2 toxin were demonstrated by a radioimmunoassay 10 week after immunization of rabbits with this new immunogen using tritiated 3'-OH-T-2 toxin as the testing ligand. Highest titers ($1:6,000$) were obtained 17 weeks after immunization and two booster injections. The antibodies had good cross-reactivity with T-2 toxin, acetyl-T-2 toxin and 3'-OH-acetyl-T-2 toxin. The relative cross-reactivity of this antibody with 3'-OH-T-2, acetyl-T-2, T-2, 3'-OH-acetyl-T-2, 3'-OH-T-2-HS, T-2 isomer, HT-2 and 3'-OH-HT-2 was 1, 3, 4, 5, 15, 30, 45 and 175 respectively. No cross-reaction was found when 3'-OH-T-2 triol, T-2-triol, T-2-tetraol, DAS and DON at a concentration of $1\text{ }\mu\text{g}$ per assay was tested. The detection limit for 3'-OH-T-2

toxin by the RIA was about 0.1 ng per assay. AA

- 3323 SLANINA (F) and FAGERLUND (B). Veterinary drug residues in foods - health effects. *Var foda*. 38(3-4); 1986; 224-38 (Swedish)

The highest potential risks from veterinary drug residues in food arise from substances with known toxic side effects which are not dose-related or for which the toxic threshold "doses" have not been established. Examples of such adverse effects are allergic reactions induced by penicillins (and other antibacterial substances), bonemarrow damage (aplastic anemia) associated with chloramphenicol exposure and liver carcinogenicity of carbadox (a chemotherapeutic formerly used in Sweden as a growth-promotor in feed). However, providing that the prescribed withdrawal times are effectively enforced, the trace amounts of drug residues present in foods of animal origin should pose a very limited health risk for the consumer. Nevertheless in cases where there is a therapeutic drug substitute available or if the benefit from the treatment is doubtful (chloramphenicol, carbadox) the use of these types of substances should be restricted or prohibited. Similar restrictions should apply for substances with dose related adverse effects (e.g. certain anthelmintics with a teratogenic effect at high doses) for which analytical methods suitable for a routine control of residues in foods have not yet been developed. AA

- 3324 FORSELL (JH), WITT (MF), TAI (JH), JENSEN (R) and PESTKA (JJ). Effects of 8-week exposure of the B6C3F1 mouse to dietary deoxynivalenol (vomitoxin) and zearalenone. *Food Chem. Toxicol.* 24(3); 1986; 213-9

Weanling female B6C3F1 mice were fed semi-purified diets containing 0, 0.5, 2.0, 5.0, 10.0 or 25.0 ppm (mg/kg) deoxynivalenol (DON) over 8 weeks and were assessed for effects on feed intake, body-weight gain, terminal organ weights, histopathology, haematology and serum immunoglobulin levels. To determine whether DON effects were potentiated by the oestrogen zearalenone (ZEA), a mycotoxin frequently found to occur with DON in cereals, two additional groups of mice were fed diets containing either 10 ppm ZEA or 10 ppm ZEA plus 5 ppm DON. The rate of body-weight gain was significantly reduced ($P < 0.01$) for all mice consuming feed containing 2.0 ppm or more of DON whereas, only the mice ingesting the diet containing 25 ppm DON showed a significantly decreased ($P < 0.10$) rate of feed consumption. Gross and histopathological evaluation of thymus, spleen, liver, kidney, uterus, small intestine, colon, heart, brain, lungs and bone marrow from control and all mycotoxin-exposed mice revealed that these tissues were normal in appearance and in histological architecture. DON-amended diets did however, cause dose dependent decreases in the terminal organ weights recorded (thymus, spleen, liver, kidney and brain). In the DON-treated groups, statistically significant dose-dependent decreases in the counts of total circulating white blood cells were associated with an increase in polymorphonuclear neutrophils and a decrease in lymphocytes and monocytes. Dietary DON caused a dose-dependent decrease in serum IgM but, in contrast, a dose-dependent increase in serum IgA. In none of the above instances was 10 ppm ZEA shown to act synergistically or antagonistically with 5 ppm DON. Since dietary DON at levels as low as 2.0 ppm exerted significant effects on the growing B6C3F1 female mouse, future approaches should include studies of the mechanisms by which this mycotoxin affects nutrient utilization and modifies the normal immune response. AA

- 3325 IBRAHIM (GF). A review of immunoassays and their application to salmonellae detection in foods. *J. Food Prot.* 49(4); 1986; 299-310

Immunoassays have been established over the years as powerful tools for the detection of a wide range of antigens. This review brings together published work in relation to principles of immunoassays

utilizing radioisotopes and enzymes, methods of amplifying the sensitivity of immunoassays, the immunochemistry of certain *Salmonella* antigens and detection of salmonella by immunoassays. AA

- 3326 SILAS (JC), HARRISON (MA), CARPENTER (JA) and FLOYD (JB). Comparison of particulate air samplers for detection of airborne *Aspergillus flavus* spores. J. Food Prot. 49(3); 1986; 286-8

Four air samplers (Millipore, all-glass impinger, Andersen and absorbent cotton) were evaluated for their ability to collect airborne grain particles contaminated with *Aspergillus flavus* spores. Corn dust containing 6.4×10^6 spores/g was aerosolized within a containment system. Each device sampled 100 L of air, thus exchanging the air in the chamber two times. Spores were enumerated from all sampling matrices using *Aspergillus flavus/paraisticus* agar. The efficiencies of the Millipore and the cotton samplers were almost identical, while that of the all-glass impinger was less. Measurement of particle size with the Andersen sampler revealed that these spores were associated with particles of various sizes. AA

- 3327 SULLIVAN (R), PEELER (JT) and LARKIN (EP). A method for recovery of poliovirus 1 from a variety of foods. J. Food Prot. 49(3); 1986; 226-28

A method was developed for the recovery of low numbers of plaque forming units (PFU) of inoculated poliovirus type 1 from seven different foods. Viruses were eluted at pH 9.0 from 25 g food test portions, concentrated at pH 4.5, and eluted at pH 7.5. The final eluates were assayed for PFU in African green monkey kidney (DCM) cell monolayers. The average virus input ranged from 55 to 79 PFU per unit portion. The average percent recoveries were as follows: potato salad, 61; radishes, 54; celery, 45; mushrooms, 44; carrots, 42; clams, 38; and oysters, 35. Three control products negative for each food. AA

- Adulteration** (See also Contamination)
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- Aeromonas** - See Pseudomonadaceae
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